FOOD INDUSTRIES

manufacturing and processing

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H. C. PARMELEE, *Editor*

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Clear Thinking Alone Can Solve Our Problems

THINKING is difficult, and most of us never think very much unless adversity forces us to do so. While it is not our purpose to get excited about prohibition, although the return of beer would cut down the sale of milk in pint bottles, the prohibition situation is cited as an example of the effect of faulty thinking. If the liquor question had been clearly thought out before any federal legislation was passed, present enforcement troubles might well have been avoided.

. . . . Overproduction is a problem much more serious than prohibition, for it involves fundamental laws of the universe which we cannot circumvent. There are no bootleggers of markets to relieve our thirst for still greater outlets for increasing quantities of goods. Overproduction, as the result of mechanization of industry, is only a lesser manifestation of a greater cosmic force, invention. "Technological unemployment" is the term ascribed to one of its byproducts in industry, but by what term shall we describe an agricultural surplus?

. . . . To understand contemporary events it is necessary to think this problem through. Space limitations permit presenting only the final conclusion: that the major product of all invention is time saving, whether it be in mechanical, scientific, or agricultural endeavor. But for what purpose is this time saved? What shall we do with it? Who shall have it? Shall everybody share it? Who gets the benefit of it now?

. . . . Even as these words are written, the American Federation of Labor is struggling with the problem of leisure time and discussing the five-hour day as a future possibility. But what man, knowing the past, as well as human nature and its less pleasing but quite understandable characteristics—or shall we say, expanding wants?—believes that organized labor will be satisfied with five hours of actual work daily? Will it not strive for increased compensation through overtime or other means? Labor faces the identical problem that we are discussing.

. . . . Booms and depressions, major and minor cycles, "good" work and idleness, will continue to follow each other like the seasons until men not only learn to think clearly about these things but become willing to accept for themselves a part of the leisure they create. Imposing this newly created leisure on less gifted individuals is forcing others to take the vacation that invention has made possible.

. . . . We are not pessimistic about this problem, because we believe in the fundamental quality of the human race to adapt itself to changes. But it is important to recognize the basic causes and to know that until adaptation learns to keep pace with invention the business cycle will remain.

EDITORIALS

NOVEMBER, 1930

Don't Kill the New Product

TOMATO JUICE is a product rather new on the market and holds great possibilities for tomato canners. The fresh vegetable market cannot encroach upon its sale, for it is distinctly a manufactured product and not merely a preserved one. It offers a way by which the tomato canner can recover any volume that may have been lost to the fresh vegetable growers of the South who produce tomatoes in midwinter or early spring. But unless it is handled properly and by conscientious firms, its popularity may be destroyed.

Choice tomatoes only should be used for the manufacture of tomato juice; but, unfortunately, some have the idea that tomato juice is an outlet for second or third grade tomatoes. Nothing could be a worse mistake. Only the best of raw materials may be used here if the quality of the product is to be such as to bring repeat orders. Furthermore, processing of the juice and the equipment in which it is handled must be such that no harm is done to its delicate flavor. An example of such harm is the metallic flavor which the juice takes on when plain steel paring knives are used and which can be distinctly tasted in some of the product now on the market. Some tomato pulp makers who have been manufacturing peeling stock pulp for many years have learned that in the knife lies the first opportunity for the metallic flavor to enter their product and avoid such contamination. Many others, less observant or experienced, do not seem to realize where the trouble comes from.

Equipment made of stainless steels, or enameled, glazed or tinned surfaces, should be the only materials brought in contact with tomato juice. If this precaution has not been followed by some plants during 1930, the managements should make up their minds to start 1931 in the proper way, or otherwise the tomato juice business will suffer defeat at the hands of its exploiters.

Poor Service

WITHIN the past sixty days in widely separated sections of the country we have heard complaints about the very poor service being rendered by some equipment manufacturers. This condition is unusual when one considers that it occurs at a time when everybody is looking for orders.

Most of the complaints were made by men who control the destinies of very large corporations and they directed their remarks at equally large equipment manufacturers. One of them stated that he had instructed his organization never to buy anything from the ——— Company if it could be possibly purchased elsewhere. He was no longer willing to permit the waste of his organization's time in going through a routine that was as complex as getting a bill through Congress in order to purchase a trifling repair part.

Another complaint referred to promises for the delivery of new equipment that were always from two to four weeks ahead of actual delivery. In this instance considerable hardship was occasioned by delay due to over-optimistic promises. Personnel, that was assembled to start the construction and erection of equipment that failed to arrive on the promised date, had to be sent away, and then called together again at a later time. Other expensive equipment had been purchased to be used with the promised but undelivered machinery and, in order to take advantage of cash discounts, money was tied up needlessly for a period of one month.

Anyone who has been engaged in manufacturing has undoubtedly run into similar circumstances. We believe that when purchases are made a delivery date should be specified upon which the seller is absolutely certain that he can deliver. As for complexities of routine in buying repair parts—the remedy is so simple that further comment is unnecessary.

When a Food Color Is Called "Certified"

A LIMITED NUMBER of synthetic colors are permissible for use in food products under Federal regulations. Some users of these colors have assumed that just because a color is "permitted" it may be assumed to be of definite quality and concentration. That is an erroneous assumption. Only when a color is labeled "certified" is it safe to assume that its purity and concentration have been passed upon by government inspectors.

In the case of primary food colors there is almost invariably a high concentration of the effective coloring material, since such a color would not be certified if it did not contain at least 82 per cent of the active ingredient. Furthermore, the certification insures that the concentration must be stated on the label and be in accordance with the actual concentration of the color present. However, in the case of mixtures, even those made up exclusively from certified primary materials, there is often added a diluent material. In such cases the lower concentration of the effective color should be shown on the label and the purchaser is able to gage the relative strength of different samples of material submitted for his purchase. In such cases it is important to notice the concentration because there is often a wide spread in percentage of color, sometimes much more than enough to account for differences in price that would otherwise seem quite unwarranted.

Those food manufacturers who require this type of materials will do well to look into their purchase practice to see whether they are taking as full account as possible of the availability of certified grades and brands

Steam-Jacketed Kettles Need More Study

NEWS of the painful scalding of six employees in a food manufacturing establishment through the sudden development of a bump in the inner bowl of a copper, steam-jacketed kettle once again recalls that technical knowledge of this important device is so meager as to be almost negligible.

The steam-jacketed kettle is essential equipment in many food industries, almost as indispensable as the boiler itself. But who knows very much about the theory of its design or what are the proper specifications to be written when purchasing a kettle?

These kettles seldom blow up, but when they do give trouble they usually develop a large interior bump which is nothing but an abortive attempt to turn inside out. If the kettle is nearly full of boiling liquid, a bump may cause the contents to slop over. Anyone who is working below when such a failure occurs is certain to be seriously burned, if not killed.

As far as is known to FOOD INDUSTRIES, there is very little definite information available on buying kettles, or what performance to expect of them. For two years we have been collecting data on this subject with the eventual hope of presenting it in a helpful manner. But up to the present we have not felt justified in printing the little that we have been able to accumulate. A few kettle users have their own specifications which are apparently of a confidential nature; but most buyers of kettles order by rule of thumb methods, or more frequently leave it to the kettle-maker to exercise his best judgment. Without specifications, cut rate prices for kettles are possible only by making them from lighter and thinner materials and, if the prospective buyer attempts to shop around for the lowest price without specifications, he is cultivating ultimate disaster. It is far better to pay a few hundred dollars extra for a good, heavily-built kettle, than to risk burning or killing employees.

Evading Responsibility

MANY COMPLAINTS have come to the attention of FOOD INDUSTRIES recently regarding the drop-shipment evil,—a condition that is always more aggravated in periods when business is not as brisk as normal. During the days of the drought, back in August, many food distributors made heavy forward commitments for future delivery and in most instances have already actually paid for the goods. But they are unwilling to give shipping instructions, except to send out small lot drop-shipment orders and insist on immediate delivery.

A drop-shipment is a nuisance to any factory where the carload unit is the rule. At best it should be regarded only as an accommodation that should not be overworked. The jobbing trade should realize that factories are seldom geared to make small shipments any more promptly than carload shipments can be made, which usually requires about twenty-four hours. Many plants can ship out a carload with even greater facility than a five-case order.

We know of an eastern jobbing house which owns approximately eight carloads of goods that are still located at the plant of the manufacturer. These goods are being ordered out piece-meal, and when we say "piece-meal" we mean that drop-shipments are being ordered in five- and ten-case lots. The extreme condition was reached one day when three long-distance telephone calls were received in an afternoon for the purpose of making sure that one measly five-case lot was shipped instantly. A more flagrant example of evasion of functional responsibility could hardly be conceived. If the jobbing function has any excuse for existence it is that it should carry ample stocks of the wares it purports to sell and should be prepared to make its own shipments on extremely short notice. It is just this sort of inefficiency that has caused some of its troubles in recent years.

Manufacturers who are asked to make an unusual number of drop-shipments should be paid for the extra bother and should charge the food distributor for the added service.

Stabilization That Stabilized

STABILIZATION of prices has been the aim of those trying to solve the surplus problem in agriculture. Desirable as this may be, the plans for actual stabilization of prices when put into effect have not been very successful. Recently, however, there has been one outstanding exception.

In 1929 the California cling peach crop was about 179,000 tons and prices went as high as $70 a ton for No. 1 fruit. In contrast to this, the 1930 crop was 485,000 tons, an amount sufficient to pack eighteen to twenty million cases, or five to seven million more than could be sold. To meet this situation, with its immediate possibilities for ruinously low prices to the growers and later cut-throat competition between canners with overflowing warehouses, the Cling Peach Control Committee was organized. Its members included canners, growers, bankers, and a representative of the State Department of Agriculture.

The committee followed a plan proposed by Preston McKinney, secretary of the Canners' League. All No. 1 cling peaches in the state were purchased for $20 a ton if they were picked and delivered, or for $13 a ton if they were left on the trees. The surplus, purchased at the latter figure, was 145,000 tons. Funds for purchasing the surplus were raised by an assessment on the canners who actually paid $28.50 for each ton of peaches canned. Only 5 per cent of the packing capacity of the state did not participate in the plan by which the pack was held down to 13,180,000 cases, including 535,000 cases canned for re-manufacture into fruits for salad.

Here is a stabilization plan that worked, without publicity, without a "sign-up" campaign, without government aid, and without squawks of protest. That the last is true may be presumed from the attitude of a widely circulated western farm paper whose editor is not given to silence when the farmer's interest is at stake.

It would hardly be fair, perhaps, to compare the cling peach control problem with stabilization problems in other branches of agriculture, but comparison is hardly necessary: the achievement stands on its own feet. The canning-peach industry deserves high praise for solving its own problems, and for its ability to get together and stick together. Both growers and canners are to be congratulated for co-operating, even when co-operation was financially painful for both sides, and for recognizing each other's necessity for existence. May their success inspire like efforts by other producer-manufacturer groups!

Hand-pitting dates in Brooklyn plant

STABILIZED PRODUCTION

Improves Labor Conditions

By H. K. EASTMAN
Factory Manager,
Hills Brothers Company,
Brooklyn, N. Y.

PROCESSING of a highly seasonal and perishable food product has been profitably converted into a stable year-round industry in spite of repeated declarations from all sorts of industries that, "It cannot be done."

As recently as nine years ago The Hills Brothers Company, Brooklyn, N. Y., growers and packers of Dromedary dates, faced the yearly problem of expanding its factory force from less than a hundred off-season employees to more than a thousand in the rush-season. This hastily recruited personnel supervised by the nucleus of year-round workers received, processed, packed, and shipped the bulk of the twelve-months' supply of fresh dates in the short period of four months.

The seriousness of this problem is best realized when one considers that about 70 per cent of the 28,000 tons of dates imported into the United States of America is handled by this company.

This fruit, which is grown in the valleys of the Tigris and Euphrates Rivers and matures in September, must be on the American market in finished package form by early October to meet the almost overnight demand for it; and, under the old rule-of-thumb system of processing, the full year's output had to be out of the packer's plant by the end of January to insure distribution to the consumers before warm weather caused the fruit to "sugar," to become infested with insects, and to be otherwise unsalable.

Bulk dates from storage are placed in warming rooms

Such a high pressure method of processing prevented economic employment of capital to control proper handling of fruit prior to arrival at the plant and to provide for factory equipment that would insure optimum processing and packaging of such a delicacy.

Worst of all, this short term of employment of more than 90 per cent of the employees nullified all attempts of the company to establish an employee pride in the product, to perfect a responsible and dependable organization, to eliminate wasteful and careless employment of human labor, and to encourage employee resourcefulness and stability. Labor turnover under these conditions was greater than 400 per cent.

Years of practical experience and painstaking research on the product showed that, if this fruit was selec-

tively packed in the bulk when harvested and kept under controlled conditions while waiting to be and after being processed, this objectionable system of season processing could be thrown into discard.

Eight years ago this company, making use of its accumulated data and accelerated experience, decided to end the hurly-burly method of co-ordinating capital and labor for the production of a packaged food product. It entered upon a plan that would result in year-round employment of capital and labor to give a food product that had been carefully and intelligently processed and packaged.

At first, production costs mounted out of proportion to the volume of business done and the yearly fiscal reports indicated the change to be unprofitable. However, as adherence to the new plan became better established and the organization responded to careful training, the increased volume of business which resulted because of improved quality and prompt delivery, the more intelligent use of capital, and the adoption of a constructive merchandising plan, began to prove the wisdom of the conversion.

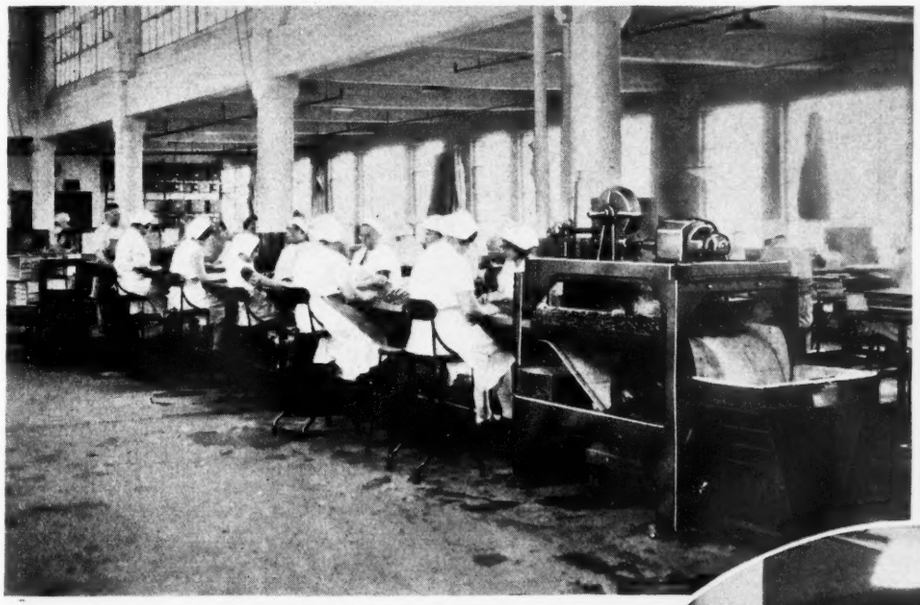
Labor turnover has decreased to less than 60 per cent; approximately 400 trained workers have steady year-round employment; latest type of process equipment has and is replacing wasteful and haphazard manual workers; production has shown a healthy increase; and net profits have been quite satisfactory, thus giving conclusive testimony in favor of the plan.

Today trained employees supervise the gathering and bulk packing of dates from our own trees and those of other growers adjacent to Basra, Iraq. At this station the dates are cleaned as they mature, and hand graded for size, color, and general appearance. Those dates intended for final packing into 2, 8, and 10-oz. packages are layered into paper-lined wooden cases, 65 lb. per case.

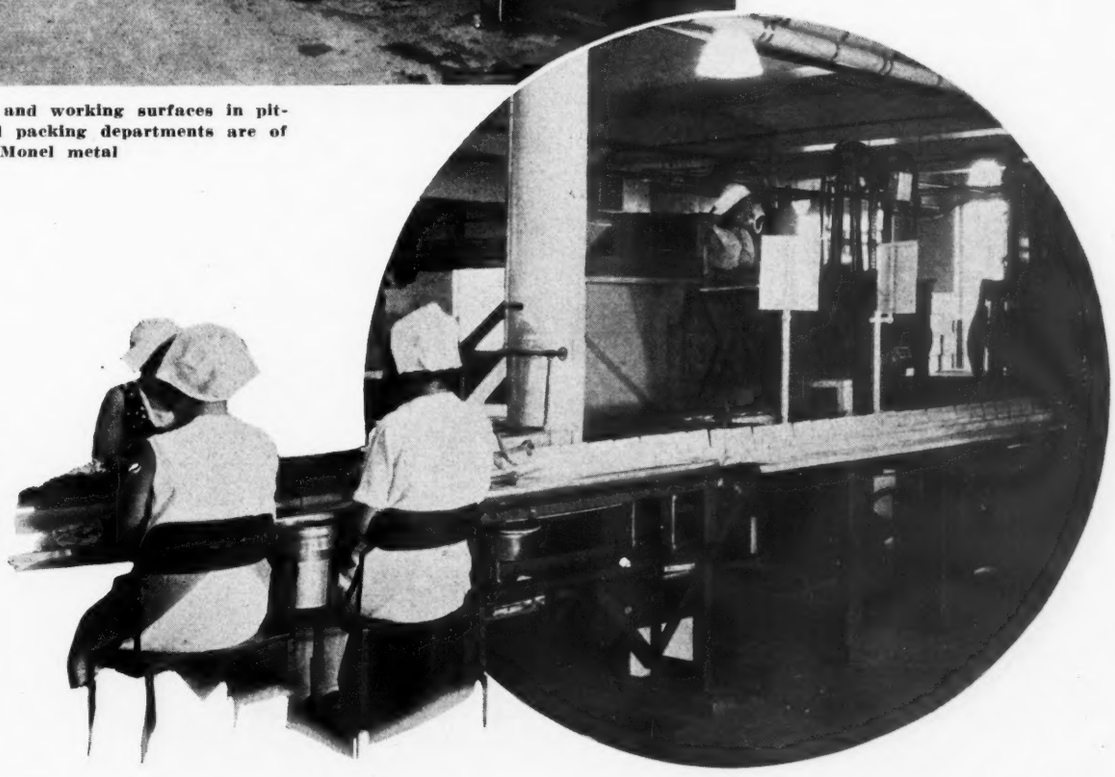
In these paper-lined cases the dates are transported by steamer to the Brooklyn plant where they are placed in cold storage and kept at a temperature of 33 to 35 deg. F. to preserve the natural flavor and to prevent insect infestation while waiting to be processed and packaged.

On the evening previous to going into factory production a working day's supply of these chilled dates is placed in warming rooms heated with byproduct steam. They are gradually and carefully warmed so that they may be separated into individual dates without damage due to tearing and without loss of sirup.

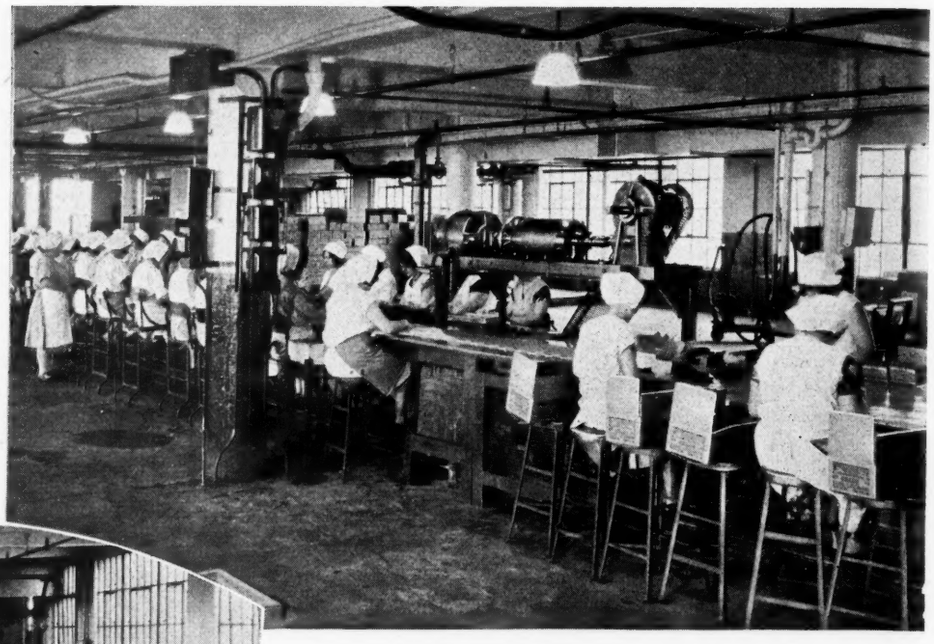
To insure packing of only clean, carefully graded



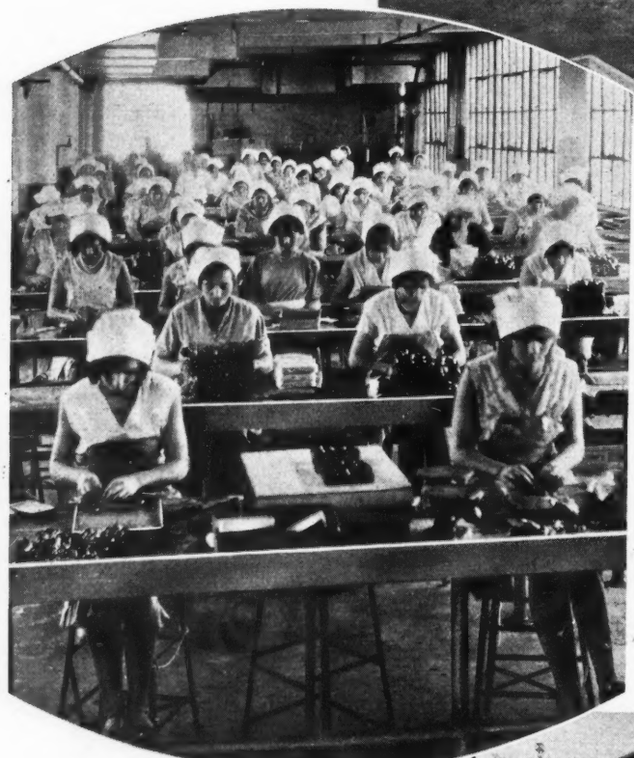
Metal containers and working surfaces in pitting, sorting, and packing departments are of Monel metal



Inner-seal cartons are machine made and automatically placed on narrow belt conveyors



Two carton conveyor belts and a wide rubber-covered belt parallel to each other form a progressive packing table

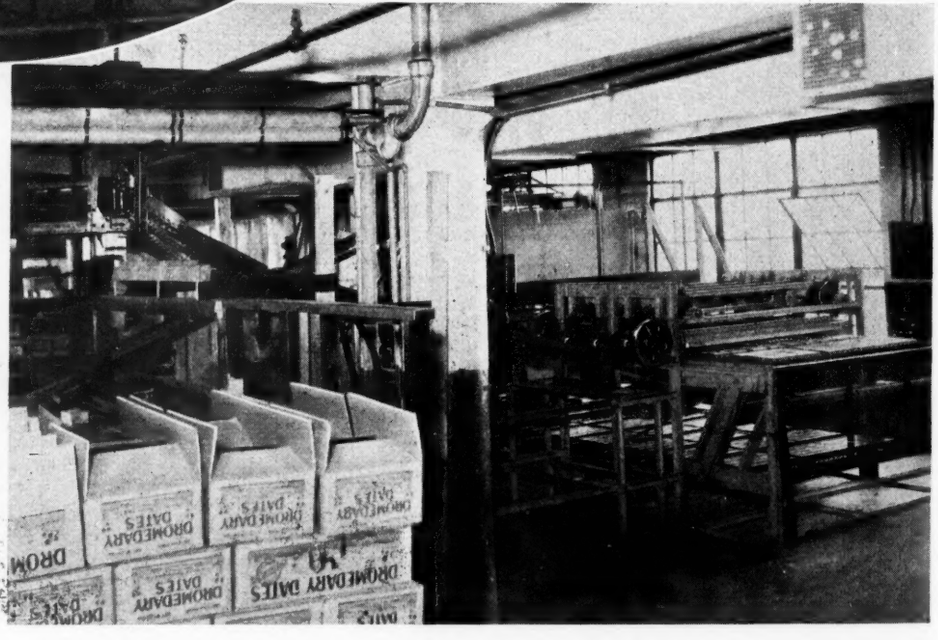


Old-style method of packing dates in Brooklyn plant

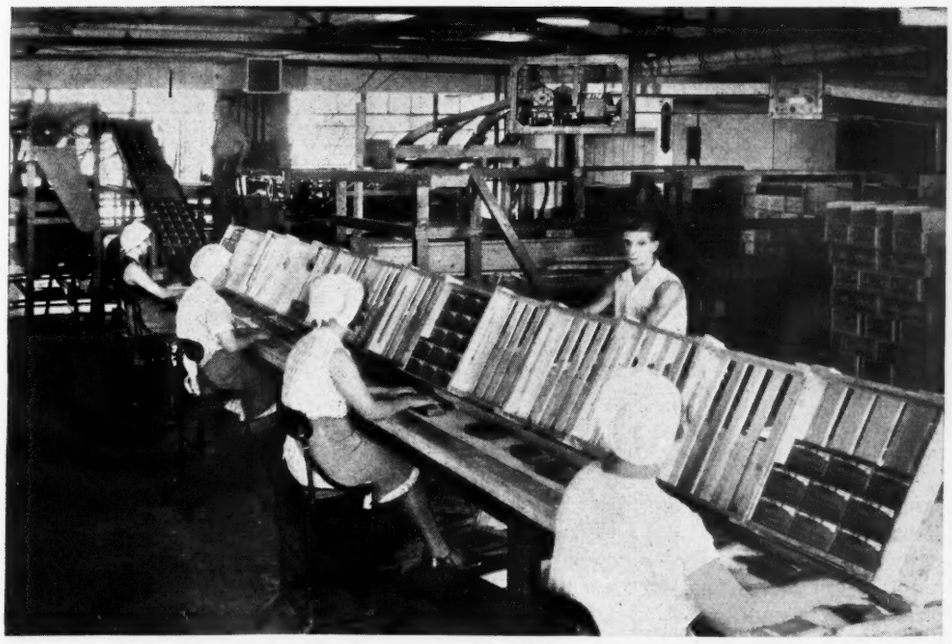
dates in the respective packages, girls seated on each side of a rubber covered conveyor belt separate the clumps into individuals and pick off the torn, ill-appearing dates. The graded dates automatically pass to the rubber-covered packing belt to be place-packed in inner-seal cartons lined with waxed glassine paper.

When the amount of dates pitted in Basra is insufficient to meet the market demand, pitting is done in the Brooklyn plant in connection with the sorting and grading, but as a separate operation. As soon as experimental installation tests show satisfactory results, mechanical pitters will replace manual pitting just as other mechanical means have gradually replaced manual labor on the monotonous operations that do not involve the application of human intelligence and judgment.

Filled cartons, containing packing symbol cards, pass from the packing department to the specially designed pasteurizer, which is charged and discharged in a con-



Packaged dates pass automatically from packing tables into pasteurizer on floor below



Pasteurized packages are cooled before being wrapped

tinuous manner at the rate of 14,000 ten-ounce cartons per hour.

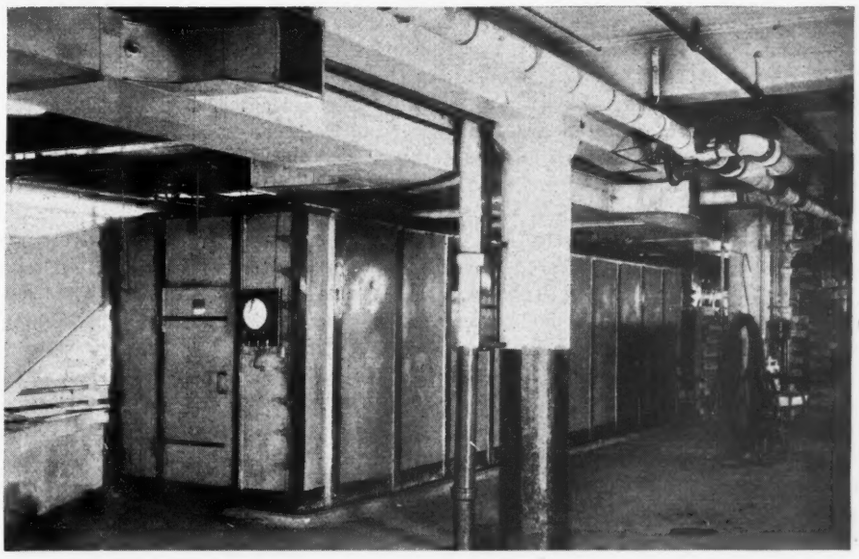
This pasteurizer, constructed to the specifications of our research department, is constantly under laboratory control. Packages are taken morning and evening from each day's run to test for micro-organism content. These control tests show that this pasteurizing treatment produces a product free from pathogenic bacteria. This pasteurization treatment also eliminates the probability of insect infestation and produces changes in the date which prevent "sugaring."

After pasteurization, the carton is finally wrapped in waxed glassine paper and packed into shipping containers for immediate shipment or for placement in cold storage according to the market demand.

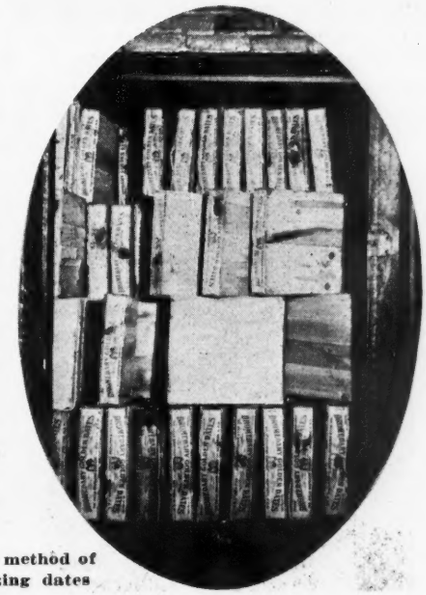
When processed in this manner under the progressive pack plan, dates taken from storage at the end of the slack season cannot be distinguished in quality of flavor, odor, or appearance from fully processed dates of the new crop. Hence dates are now processed during the spring and summer months and held in storage in anticipation of market demand. This permits fulfillment of contracts at times specified without necessitating the uneconomic use of capital and inexperienced labor.

Operating under this plan, we have in the past eight years been able to make capital investments that give us profitable returns and at the same time take the guesswork out of our processing operations. We are able to set up production budgets for prorated monthly production and at the same time make all installations and do maintenance repair work without jeopardizing delivery of fully processed products during the rush season. This enables us to operate on a financial budget system that gives us known production costs in advance.

We have been able to pick the best of all applicants that have sought a place on our payroll and to



Recording controller regulates humidity and temperature conditions in pasteurizer



Old-style method of pasteurizing dates

train each to do the painstaking tasks that we feel are essential to the production of a wholesome food product, thus enabling these picked workers to become part of the 400 that can depend on steady year-round work. The stabilized earning period and improved working conditions have brought us a higher quality type of applicants.

Best of all we have been able to prove that, if proper study be made of the product and methods of processing, perishable, highly seasonal foodstuffs do not necessarily demand wasteful employment of capital and labor to meet market conditions.

FERMENTATION

In Food Manufacture

By H. T. HERRICK

Principal Chemist, Color & Farm Waste Division, Bureau of Chemistry and Soils, U. S. Department of Agriculture, Washington, D. C.

THE earliest applications of fermentation reactions deal with the production of food materials. At the present time, at least 10 per cent of the total production of the food industries in this country makes constructive use of changes produced by micro-organisms. The enormous damage done by their undesirable activities is also of major significance to food manufacturers.

At the symposium on industrial fermentations held by the American Chemical Society in Cincinnati, Ohio, on Sept. 8, five of the ten processes discussed were concerned with the production of materials used in the food industries. It was pointed out that fermentation reactions of all kinds are essentially catalytic. Any given organism may produce a number of different catalysts, depending on the food which is supplied to it and the condition under which it works, and the same finished product may be evolved from a number of different raw materials. The whole problem of the utilization of micro-organisms in chemical changes resolves itself into the bringing together of the right organism, or organisms, and the right medium under the best conditions.

Of the three types of micro-organisms utilized in biochemical reactions, bacteria, yeasts, and molds, the outstanding practices in the fermentation field are a result of the action of bacteria and yeasts. With recent work, however, molds are also assuming a prominent position. As an example of yeast fermentation, the production of alcohol is sufficiently familiar to require no explanation. The production of lactic acid is an excellent example of bacterial fermentation. The raw material may be any substance containing a fermentable sugar, or starch which may be converted into fermentable sugar. Because of the sensitiveness of lactic-acid bacteria to an excess of acids, it is necessary to neutralize the fermentation with limestone while it is in progress. In addition to its ordinary uses in dyeing, the production of lacquer solvents, and the deliming of hides after the dehairing process, lactic acid in its pure form is finding an ever-increasing use in food and beverage products. It is now employed in infant's foods, low alcohol beers, soft drinks, candies, poultry, and stock foods.

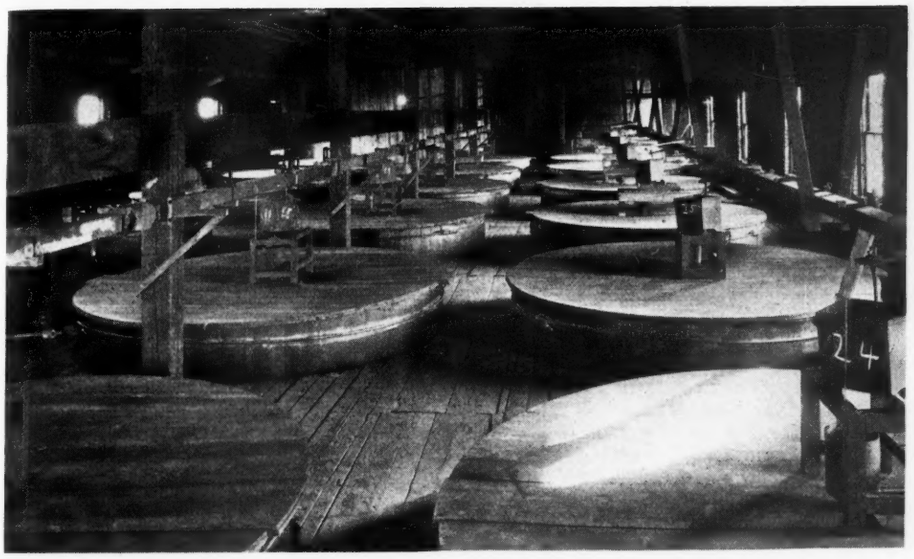
To supply yeast in the manufacture of bread, it was formerly the custom to save a portion of each batch for the inoculation of subsequent portions of dough. With the transfer of bread-making from the homes to the bakery and improvement in manufacturing and transportation facilities, the use of fresh yeast has entirely transplanted this older method. Enormous quantities of yeast are now manufactured for this purpose, and conditions of production and distribution controlled with the greatest care. Because of its vitamin content, yeast also is now entering the diet directly in increasing quantities.

Although the use of fermentation in the production of such food products as cocoa and chocolate, cured meats and fish, cheese, sauerkraut, vinegar, pickles, olives, black tea, and soya sauce is generally recognized, it is not so well known that bacteria may be utilized to produce the gas by which foods are cooked. The history of the decomposition of organic matter by bacteria, and the potential utilization of the methane so produced as a fuel, was traced at the symposium. A prediction was made that with the exhaustion of present fuel supplies, fermenting farm waste may replace natural gas as a source of fuel for the farm.

One of the newest industrial fermentation installations is that which is now producing citric acid. For a number of years the citrus fruit industry in this country and in Italy, chiefly the latter, had been the only source of the citric acid used in soft drinks and pharmaceutical products. The raw material for the manufacturing processes was crude citrate of lime recovered from lemon juice and shipped to factories for production of the refined product. Under the Fascist administration in Italy, a high export tax was placed on the crude citrate. As a result, the price of citric acid in all the other countries of Europe jumped more than 50 per cent, and the result in the United States would have been much the same, for the citrate of lime production of the lemon groves of California is not sufficient to meet the needs of the American consumer, particularly the year when good fruit is plentiful and culls are rare.

H. T. HERRICK

Fortunately, a process which utilizes the action of mold on cane sugar solution became available at the psychological moment. As a result of work originally done in the Department of Agriculture, followed by ten years of intensive study on an industrial scale, millions of pounds of citric acid are now being produced in this manner. Gluconic acid, also produced by molds with corn sugar as a base, is another new fermentation product.



OPERATING FLOOR of a distilled vinegar plant, showing the hard rubber dumpers which tilt periodically to discharge vinegar mix to the sprinkler beneath the cover

Modern Practice in

VINEGAR MAKING

By W. R. FETZER
Central Valley Vinegar Company, St. Louis, Mo.

VINEGAR has been a part of man's diet since the earliest record of his activities. It is mentioned in the writings of Moses and the Proverbs and was used by Hippocrates in his primitive practice of medicine. During the thirteenth and fourteenth centuries, vinegar was believed to be effective in the treatment and prevention of plague. In the Civil War, it was used with considerable success to prevent an incipient attack of scurvy among soldiers.

In addition to its direct use on the table, vinegar today has an indispensable place in industrial food processing in the preparation of mayonnaise and French dressing, prepared mustard, horseradish, and in the countless varieties of pickles and relishes.

Vinegar is the product obtained by the acetous fermentation of various kinds of alcoholic solutions. The fermentation is, chemically, an oxidation of alcohol to acetic acid, produced by the *Bacterium schützenbachi* and related species, the oxygen coming from the air. As originally carried out, the reaction was dependent upon the surface area of the vinegar stock in contact with air and naturally was very slow. In 1832, the "quick vinegar" process originated. In this process the surface area of vinegar stock in contact with air was increased many times by passing the liquid downward over beechwood shavings, or other suitable material, in a cylindrical tank, to meet a current of ascending air introduced through small holes at the bottom. The upward current of air within this cylindrical tank or "generator," is produced through a "chimney effect," the air within, because of heat evolved through oxidation of alcohol to acid, being warmer than the air outside the generator. The original method of distributing vinegar stock over the shavings was by hand, but this was soon succeeded by an automatic device known as a "tilting periodic dumper," which is in common use today.

Theoretically, vinegar might be made from almost any liquor containing sugar, after proper alcoholic fermentation, but only four types assume commercial importance: "distilled," cider, corn sugar, and malt.

The term "distilled" vinegar is somewhat misleading, for the qualifying word "distilled" does not refer to any special process in its manufacture, but signifies that the vinegar is made from distilled alcohol rather than from alcohol which has not been separated from the spent wort of the alcoholic fermentation, as is the case with cider and malt vinegars. Low-proof spirits, ranging from 20 to 40 proof, are produced with an ordinary beer still from grain or molasses mashes and under these conditions assume a bouquet depending upon the type of mash. The "low-wines," to use the parlance of the vinegar maker, produced from grain mashes are said by many to produce a finer flavored vinegar. Distilled vinegar factories usually are connected with yeast factories and obtain their supply of alcohol from the spent wort after the yeast has been harvested, thereby effecting mutual economies in both processes. Small distilled vinegar factories more often buy their alcohol, using special denatured formulas. Distilled vinegar is very pale yellow in color. The usual concentrations range from 10 per cent to 12½ per cent acetic acid. Ten per cent vinegar is often called 100-grain vinegar, receiving this designation from the custom of referring to a $\frac{1}{10}$ per cent acetic acid as a "grain."

Cider vinegar is made from fermented apple cider.

The color and the flavor depend, to a very large extent, upon the care taken in choosing the raw material and in fermenting the cider. The color varies from a light to a deep brown. The usual concentrations, as produced, form from 4½ per cent to 6 per cent acetic acid.

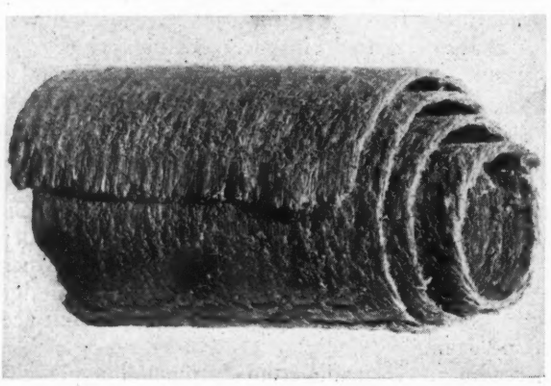
Corn-sugar vinegar is made from chipped corn sugar. Solutions of the sugar are fermented, the alcoholic liquor being clarified and used for vinegar stock. The resulting vinegar is light brown in color and the usual strengths run from 5 per cent to 6 per cent acetic acid, although 8 per cent strengths are reported.

Malt vinegar, as its name implies, is made from barley malt. Distillers' malt is ground and mashed at 145-150 deg. F., at which temperature the diastase of the malt changes the starch to sugar. The mash is then fermented with yeast, filtered, and the clear filtrate used as vinegar stock. The color and strength are approximately the same as for cider vinegar.

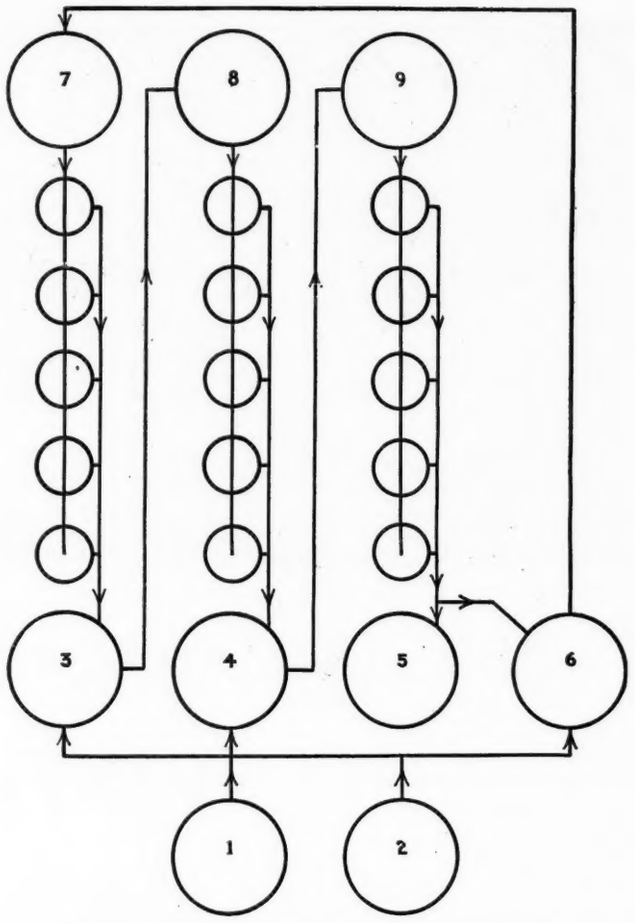
All of the above vinegars, when purchased by the consumer in the retail market, will be found to be 4 per cent, 4½ per cent, and 5 per cent acetic acid, the definite reduced strengths for manufactured or blended vinegars. Distilled vinegar is much the cheapest. This fact, together with the substantial economy in freight on the shipment of equal quantities of acetic acid, through its higher acetic-acid content, readily explains the dominant place it holds in the vinegar market.

The majority of generators in use in this country are wooden tanks, 4 ft. in diameter and 8 ft. high. Approximately the same dimensions have been used since the quick vinegar process was established. The most suitable height is said to have been determined when the generators were manually operated. The width is fixed by the wooden dumper, which does not function well when the generator is too large. The generator has a false perforated bottom, which permits an even distribution of air under the column of shavings and a plate for distributing the vinegar stock, which is received periodically from the dumper. In recent years there has been a tendency to increase the size of the generator. The sizes usually employed are 8x16 ft. and 10x20 ft., which are based on the same ratio of length to width employed in the 4x8-ft. type. The "10x20's" are fed by a rotating sprinkler, which is operated periodically as is done with the smaller generators. The generator usually contains a perforated shelf half way up which takes the weight of the upper half of the shavings off the lower half and thus prevents crushing of the shavings, which would interfere seriously with the circulation of air.

The "10x20" generator has several advantages over the "4x8." The installation cost is much less than an equivalent number of the smaller generators, usually figured as fourteen. The pipe necessary to collect the run vinegar and feed the generator is correspondingly reduced. With the decrease in the number of generators in employing "10x20's" it is possible to obtain a daily check on individual generator production, something seldom practical with a small generator installation.



BEECHWOOD SHAVINGS with which the generators are packed have a decided curl, giving a large surface area without matting



FLOW SHEET of a tandem operated vinegar factory

1. Low wine tank
2. Nutrient tank
3. "B" mix tank
4. "C" mix tank
5. Finished vinegar
6. "A" mix tank
7. "A" feeding tank
8. "B" feeding tank
9. "C" feeding tank

Generators usually are filled or packed with beechwood shavings, which have a pronounced curl and do not straighten out when moistened with vinegar. Other materials, such as rattan wound on poles, corncobs, coke, and lump pumice are used. The last-named material, imported from Sicily, has come into prominence during the last decade. It does not crush or mat down and generators "run" cooler during the summer months when packed with this material.

Hard rubber, Duriron, and wood pipe are generally used throughout the plant in handling vinegar. Pumps usually are of bronze or Duriron.

The daily production of distilled vinegar from a "4x8" generator varies from 6 to 9 gal. of 10 per cent vinegar. The larger type, "10x20," produces from 80 to 100 gal.

Theoretically, the oxidation of alcohol to acetic acid is accompanied by a chemical gain—1 lb. of absolute alcohol producing 1.304 lb. of acetic acid. In practical operation, the full extent of the chemical gain is never realized as it is necessary to leave from 0.2 per cent to 0.5 per cent of alcohol in the finished vinegar in order to maintain

an active generator. This loss, together with the evaporation losses of both alcohol and acetic acid in the generator, cut down the chemical conversion until a yield 70 per cent of the theoretical is considered satisfactory operation by most plants.

The evaporation losses and the quantity of residual alcohol in the finished vinegar are usually comparatively fixed quantities in most factories. Another method of determining efficiencies which takes these losses into account is used extensively. It is based on the assumption that a gallon of 12½ per cent alcohol (25 proof) should yield a gallon of 10 per cent vinegar. Such operation is defined as 100 per cent, although its equal in actual chemical efficiency is 77.8 per cent. Ninety per cent operation (70 per cent actual), figured by this method, is considered very satisfactory operation.

Alcoholic solutions are not fed to the generator directly, but are first mixed with vinegar to a definite acidity. This procedure curtails the evaporation of alcohol and provides the generator with narrow limits between the acidity of the "feed" and "run," which makes the unit more easily controlled. In the manufacture of distilled vinegar, a small amount of mineral salts and organic nutrient, usually malt extract, is added for the growth of the vinegar organisms. The following example of the composition of feed and run from a single-pass "10x20" distilled vinegar plant will illustrate the procedure:

	Feed Per Cent	Run Per Cent
Acidity	8.10	10.10
Alcohol	2.40	0.40

Some manufacturers of distilled vinegar pass the stock through two and even three sets of generators in series, with increasing acidity, rather than through a single generator. Such procedure, called tandem operation, is based on the principle that the preliminary sets, containing a higher percentage of alcohol in their run-vinegar than could be allowed in the finished vinegar, produce more acetic acid per unit of shavings than is possible in the single generator. This scheme increases the capacity of a plant, but the gain is somewhat offset by increased evaporation. The following table, giving the composition of feed and run, illustrates tandem operation:

		Acidity Per Cent	Alcohol Per Cent
A	Feed	6.25	4.00
	Run	8.50	1.75
B	Feed	7.25	3.00
	Run	9.25	1.00
C	Feed	9.00	1.75
	Run	10.20	0.50

The run-vinegar is filtered through asbestos, "Filtercel," or sand; the first two giving a product of good brilliancy. The presence of vinegar eels in finished vinegar generally is an indication of careless manufacture. Bottled vinegar is pasteurized to prevent subsequent haze and sediment which detract from its appearance.

The chemical examination of distilled vinegar includes the usual tests for acidity and alcohol and the determination of iron and copper. The presence of either of these metals in appreciable quantities is objectionable. In cider vinegar the quantity and character of the ash are important.

Exact statistics of the quantity of vinegar produced in this country are not available. Figures from the biennial Census of Manufactures for 1927 show that 194 establishments report the manufacture of vinegar. Of this number, 131 were engaged primarily in the manufacture of vinegar and cider and 63 were engaged primarily in other lines of manufacture, but made vinegar as a secondary product.

The largest producer of distilled vinegar has approximately seven thousand generators producing, which should give an estimated production of twenty million gallons of 10 per cent vinegar. During 1929, the government reports that over nine and a quarter million gallons of specially denatured alcohol were withdrawn for vinegar purposes—equivalent to thirty million gallons of 10 per cent vinegar. Allowing for other manufacturers who produce their own alcohol, it would seem that an estimate of at least sixty million gallons of 10 per cent distilled vinegar could be made.

Data on the quantity of cider, corn sugar, and malt vinegar produced are even more difficult to obtain, for these vinegars are manufactured in numerous small plants. An estimate would be fifteen million wine gallons, although this would be a much smaller figure if reduced to 10 per cent gallons.

A BATTERY of vinegar generators of a widely-used style
Courtesy Hauser-Stander Tank Company

MODERN RICE MILLING

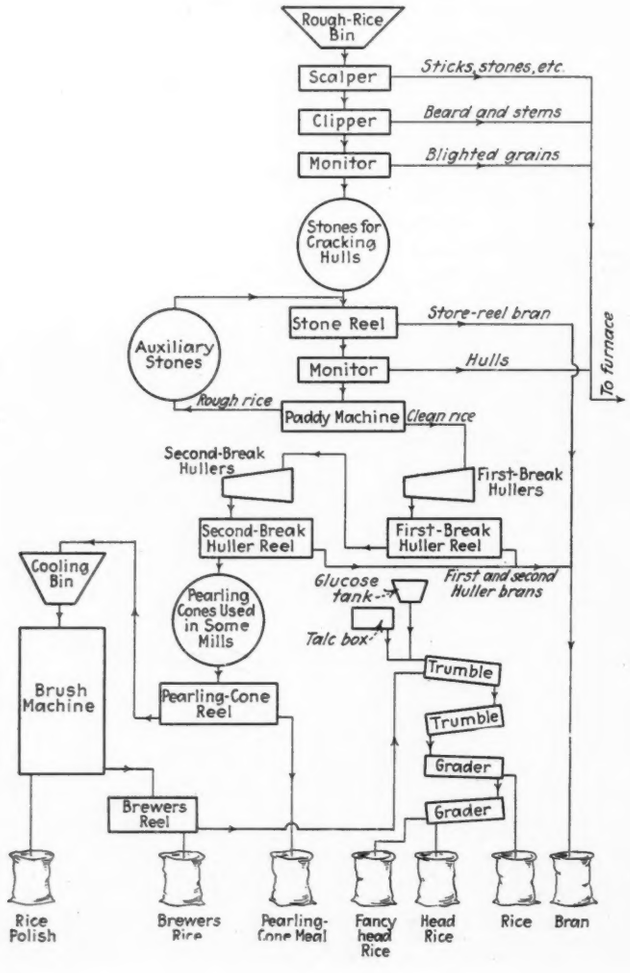
As Practiced in the World's Largest Complete Mill

By T. B. WAYNE
Consulting Chemical Engineer
Houston, Texas

THE HAND pestle and mortar probably was the first rice mill. It consisted of a hollowed log and a pestle. About a bushel of rice was placed in the mortar, and this was pounded with the pestle. The blows cracked the hulls, and the abrasive action of the broken hulls on the rice removed part of the bran coat. The chaff and bran were removed by fanning or winnowing.

The "woodpecker" rice mill supplanted the hand pestle. The mortar was used as before, and a larger and heavier pestle was fastened to a wooden beam 6 or 8 ft. long, and this was placed on a fulcrum. By stepping on and off the end of the beam, the operator raised and lowered the pounder. "Woodpecker" mills are still used in the Orient. The average capacity is about 11 bu. of rough rice, or "paddy," a day.

Fig. 1—Diagram showing the various steps followed in the modern rice mill in preparing rice for market



The next stage in the evolution of the modern process introduced the use of water power and steam power in rice milling. The fundamental features of the drop pestle and mortar system were retained, but the introduction of power greatly increased the capacity of the mills. The drop pestle method remained popular until about 1890, and in fact some millers of the older school claim that rice milled in a drop pestle and mortar mill is as well finished as that which comes from a modern plant, the new processes having the advantage only in regard to capacity, economy, and sanitation.

The present processes of rice milling probably were evolved as the result of the migration of farmers from the Northwest soon after the Civil War. They introduced many improved methods of handling grain, which were easily adapted to rice milling. Many improvements followed, and today rice milling is a highly developed mechanical process. Chemical processes have not yet entered into rice milling practice, although it is quite probable that they will, after more uses are worked out for rice and its byproducts. However, the milling operations, proper, for the production of polished head rice will most likely remain a mechanical process.

The milling of wheat and of rice are fundamentally opposite, since in rice milling the primary object is to remove the husk and yet preserve the kernels as whole grains.

The diagram shown in Fig. 1, which is from U. S. Department of Agriculture Bulletin No. 570, explains how rice is milled in a modern rice mill. Slight changes have been made in some of the more modern mills, but the fundamental operations are clearly indicated in this diagram.

America's largest rice mill, also the largest complete rice mill in the world, is the modern milling plant of the Lake Charles Rice Milling Company, of Lake Charles, La., shown in Fig. 2. It has a milling capacity of 5,200 bbl. of rough rice daily. The milling process is essentially the same as that shown in the accompanying dia-

Fig. 2—Plant of the Lake Charles Milling Company, the largest complete rice milling plant in the world

gram. However, a description of some of the ingenious machines used in this plant will be of interest.

Rice, as it is received by the mill, is termed "rough rice." It is obtained in sacks containing from 175 to 230 lb. each, and is bought and paid for usually on the basis of the "barrel" of 162 lb. The rough rice is dumped

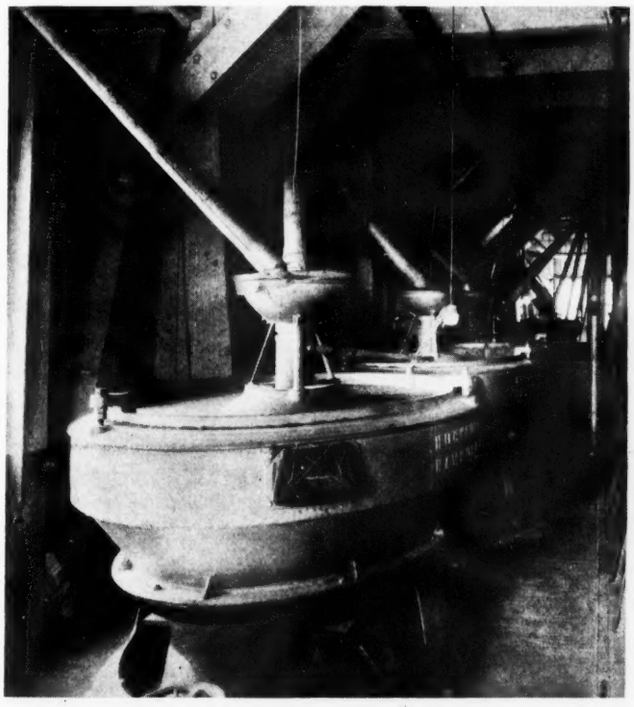


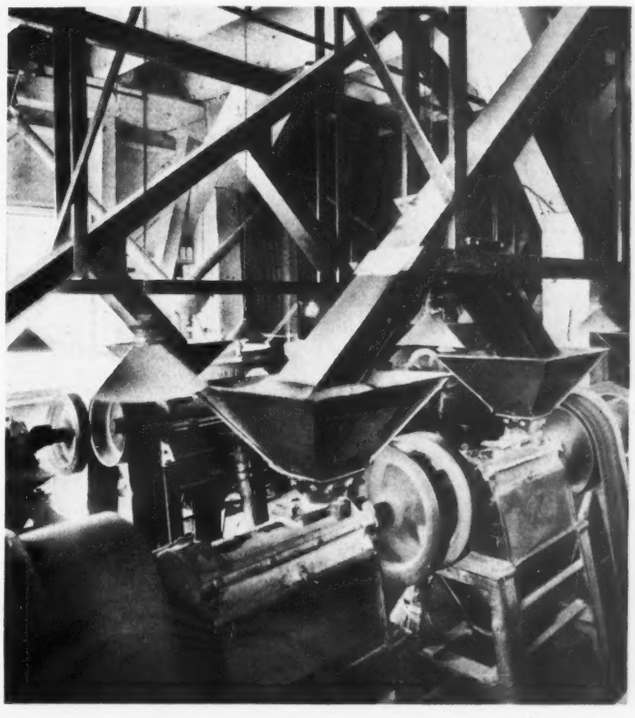
Fig. 3—Hulling stones such as these, used for removing the hulls from rice grains, are similar to the buhrstones used in flour mills

into the rough-rice bin and goes successively through the scalper, clipper, and monitor, as indicated in the diagram, and then to the hulling stones. These are somewhat similar to the old-time flour-mill buhrstones and are shown in Fig. 3. The top stone revolves and is set the proper distance above the lower stone to allow the rice grains to assume a somewhat vertical position. The hulls are cracked or split by the pressure exerted on the ends of grains, and the kernels drop out. Each variety of rice requires a radically different "set" for the stones, and variations are necessary for different lots of the same variety.

Broken hulls, germs, and some true bran are separated from the hulled and unhulled rice coming from the hulling stones in a large revolving reel; the larger pieces of hulls passing over with the rice are removed by suction in the "monitor." An ingenious device, called a "paddy machine," consisting of a large box shaker fitted with vertical metallic plates to form zigzag divisions, separates the lighter, unhulled ("paddy") grains from the heavier, hulled grains. These plates and the shaking action cause the paddy grains to move gradually upward and over the machine into a trough, while the heavier, hulled grains are collected at the lower side. The unhulled grains are sent to auxiliary hulling stones which are set to smaller clearances, and then re-enters the main stream going to the stone reel.

Rice with its hulls removed is called "brown rice," and contains its light-brown bran coat. This bran coat is made up of seven distinct layers which envelop the starchy interior of the kernel. Most of the six outer layers and part of the seventh, or aleurone layer, are removed in the succeeding operations. Since the aleurone cells are rich in protein, and this constituent is present also in the endosperm, only about 10 per cent of the

Fig. 4—These so-called "hullers" are actually rotary machines for removing the bran coating of the rice grains



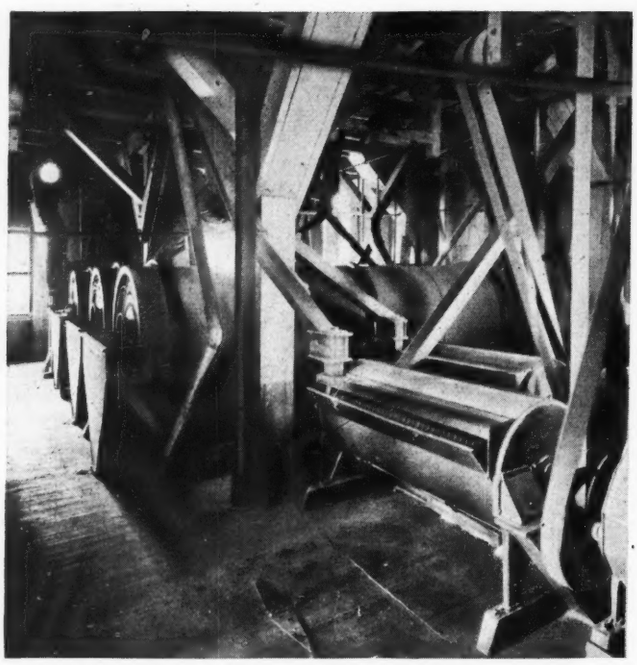


Fig. 5—Disk graders appear in the foreground of this picture, while in the background are a row of trumbles, used for coating the rice with a mixture of talc and glucose

protein of the hulled rice is removed in the milling process. The oil, present largely in the germ, is removed to the extent of about 85 per cent, and the proportion of mineral salts is reduced nearly 70 per cent, as shown in U. S. Department of Agriculture Bulletin No. 330, F. B. Wise and A. W. Bromell, p. 3.

The removal of the bran layers is done in two sets of "hullers"—i.e., the first-break and second-break "hullers." "Huller" is a misnomer, as the function of this machine, which is shown in Fig. 4, is to remove bran layers instead of the hulls. These bran layers are removed by the scouring action between the inner walls of machine and the rapidly revolving, grooved inner core, so spaced as to remove the bran layers with as little breaking of the grain as possible.

The mixture of scoured kernels and bran then passes through the first-break bran reel, where the bran is separated, and the rice goes to the second-break hullers, similar to the first set, but adjusted for closer scouring of the kernels, where more of the bran coat is removed. After leaving the second set of hullers, the rice is much whitened, and then goes through a second bran reel. Pearling cones are used in some mills as an adjunct to the hullers or instead of the last set of hullers. The Lake Charles Milling Company does not use pearling cones.

The rice passes from the second-break huller to a cooling bin and then goes to the brush machine. This machine consists of a vertical cylindrical frame covered with soft leather strips which revolves at a high rate of speed within a concentric cylinder of wire screen. The rice is rubbed smooth by friction within this machine during its travel downward through it. Considerable heat is generated in the brush, and cooling is accomplished by a stream of air which travels upward through the machine, countercurrent to the flow of rice.

From the brush the rice passes through the brewer's reel, where the smallest fragments are removed. This reel usually is covered with a 10-mesh screen, and the rice fragments passing through it are known as "brewer's rice" because, before adoption of the Eighteenth Amendment, large quantities of this grade were used in the manufacture of beer.

Specifications for Grades of Milled Rice

Class	Grade	Red Rice and Damage Other Than Heat	Number in 500 Grams		Size Separations				Chalky	Other Rices	Color
			Cereal Grains, Seeds, Heat-Damaged Kernels		Whole Kernels	Broken Kernels Through Sieves—					
			Total	H. D. and Seeds (Singly or Combined)		No. 5½	No. 6	No. 6½			
		Per Cent	*No.*	*No.*	*Per Cent*	*Per Cent*	*Per Cent*	*Per Cent*	*Per Cent*	*Per Cent*	
Long	Extra Fancy (U.S. No. 1)[1]	0.5	3	1	90	.....	0.5	.....	0.5	1	White or creamy.
	Fancy (U.S. No. 2)[1]	1.5	8	4	85	.....	1.0	.....	1.5	2	White, creamy, or grayish.
	Choice (U.S. No. 3)[1]	2.5	18	10	75	.....	1.5	.....	3.0	4	White, creamy, or grayish, and may be slightly rosy.
	Medium (U.S. No. 4)	5.0	40	24	65	.....	3.0	.....	6.0	4	Any color except badly damaged or extremely red.
	Sample grade[2]									4	
Short	Extra Fancy (U.S. No. 1)[1]	0.5	3	1	95	.....	0.5	.....	0.5	1	White or creamy.
	Fancy (U.S. No. 2)[1]	1.5	8	4	90	.....	1.0	.....	1.5	2	White, creamy, or grayish.
	Choice (U.S. No. 3)[1]	2.5	18	10	80	.....	1.5	.....	3.0	4	White, creamy, or grayish, and may b e slightly rosy.
	Medium (U.S. No. 4)	5.0	40	24	70	.....	3.0	.....	6.0	4	Any color except of badly damaged or extremely red.
	Sample grade[2]									4	
Round	Extra Fancy (U.S. No. 1)[1]	0.5	3	1	95	.....	0.5	.....	1.0	1	White or creamy.
	Fancy (U.S. No. 2)[1]	1.5	8	4	90	.....	1.0	.....	3.0	2	White, creamy, or grayish.
	Choice (U.S. No. 3)[1]	2.5	18	10	80	.....	1.5	.....	6.0	4	White, creamy, or grayish, and may be slightly rosy.
	Medium (U.S. No. 4)	5.0	40	24	70	.....	3.0	.....	10.0	4	Any color except of badly damaged or extremely red.
	Sample grade[2]									4	
Mixed	(See footnote 3)										
Second hand	Fancy (U.S. No. 1)	2.0	20	16	.....	.....	5.0	25.0	5.0	.....	White, creamy, or grayish.
	Choice (U.S. No. 2)	6.0	50	40	.....	.....	10.0	40.0	10.0	.....	Any color except of badly damaged or extremely red.
	Sample grade[2]										
Screenings	Fancy (U.S. No. 1)	.....	30	20	.....	10.0	25.0	.....	10.0	.....	White, creamy, or grayish.
	Choice (U.S. No. 2)	.....	70	60	.....	15.0	50.0	.....	15.0	.....	Any color except of badly damaged or extremely red.
	Sample grade[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Brewers	Fancy (U.S. No. 1)	.....	50	40	.....	.....	.....	.....	.....	.....	White, creamy, or grayish.
	Choice (U.S. No. 2)	.....	80	70	.....	.....	.....	.....	.....	.....	Any color except of badly damaged or extremely red.
	Sample grade[2]	.....	.....	.....	.....	.....	.....	.....	.....	.....	

[1]Rice of the grades Extra Fancy (U. S. No. 1) and Fancy (U. S. No. 2) in classes I, II, III, and IV shall be well milled. Rice of the grade Choice (U.S. No. 3) in classes, I, II, III, and IV shall be reasonably well milled.

[2]Shall be milled rice which does not come within the requirements of any of the other grades of the class to which it belongs or which has any commercially objectionable foreign odor, or is musty or sour, or is heating, hot, infested with weevils or other insects injurious to stored rice, or is otherwise of distinctly low quality, or contains more than one-tenth of one per centum of foreign material excepting cereal grains and seeds, or contains more than fourteen and one-half per centum of moisture.

[3]Mixed milled rice shall be graded according to the grade requirements of the class of milled rice which predominates over each other class in the mixture; the grade designations of such rice shall include, successively in the order named, the name of the grade, or the number thereof, the word "Mixed," and, in the order of its predominance, the name and approximate percentage of the whole kernels of each class of rice in the mixture.

NOTE—The figures in the above tabulation in all cases, except whole kernels, indicate maximum limit; the figures under whole kernels indicate minimum limit. The above is merely an abridged tabulation. For the definitions and requirements of the classes of milled rice, see section 17.

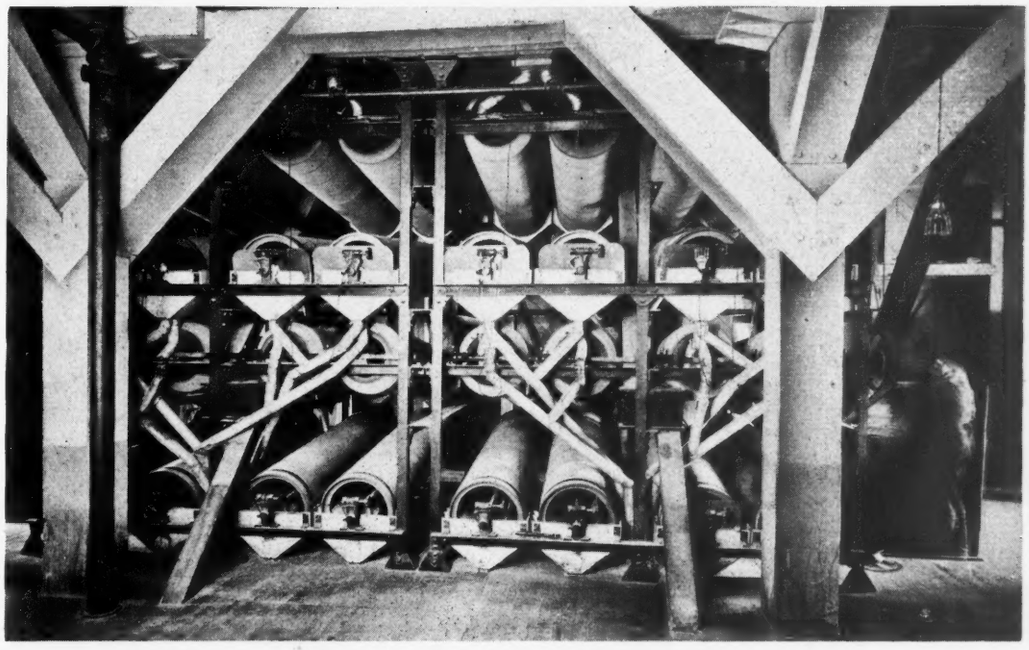


Fig. 6—These cylindrical graders separate the "second head" rice from the screenings and are similar to the "cockle" cylinders used in wheat milling

The coating of glucose and talc is applied in revolving trumbles, consisting of cylinders about 9 ft. long and 4 ft. in diameter set on an incline of about 15 deg. from the horizontal. Not all rice is coated with glucose and talc, as the trade often prefers the uncoated grade, but the luster of the grains is improved by this practice.

Grading of the clean rice in this mill is done in two types of graders. The head rice, consisting of unbroken kernels, is separated from the miscellaneous sizes in a grader, shown in Fig. 5, consisting of a row of vertical disks mounted on a revolving shaft. These disks contain indentations which collect the smaller sizes and carry them over and discharge them into a chute leading to the cockle cylinders, shown in Fig. 6, where a further separation into second head rice and screenings is effected. The cockle cylinder was first used in the removal of cockle from wheat, and has since been adapted to the grading of clean rice. Its principle is also that of removing the smaller particles by catching them in a series of indentations and then carrying them over as the cylinder revolves and dropping them on an adjustable metal apron contained within the cylinder. The size separation of the rice may be changed at will by adjusting the position of the apron on the stationary axle and thus raising or lowering the edge of the apron. The mill is equipped with cylinders having depressions of different diameters for grading rice of different varieties, since the individual kernels of different varieties of rice vary considerably in size and shape.

Specifications for the grades of milled rice were set forth in U. S. Department of Agriculture Circular No. 133. A table summarizing these specifications, appearing on page 16 of this circular, is reproduced herewith.

A mixture of the brans from the stone reel, first-break huller, and second-break huller is sold as rice bran, while the polishings from the brush are sold as rice polish. Rice polish is derived from the final scouring and polishing processes, hence contains a relatively larger proportion of carbohydrates, and less protein, fat, and crude fiber than the mixed bran. This material is widely used in feeding swine and other livestock. Rice hulls usually are burned as fuel for steam generation. However, part of the output of the Lake Charles Rice Milling Company is sold for the manufacture of a purified α-cellulose.

Rice bran, containing a mixture of the various brans, is sold as stock feed. Considering the recognized dietetic value of the proteins, vitamines, and mineral salts of the bran layers as set forth by many investigators, it seems possible that some well-directed chemical research might develop several new food products, and possibly some highly efficacious medicinal extracts or concentrates which would have wide application in the treatment of certain deficiency diseases.

Developments in rice milling during the past ten years have been largely confined to perfection of mechanical devices and to standardization of grading and marketing methods. Practically no progress has been made in the development of new uses for rice and its byproducts, and this should undoubtedly prove to be a fertile field of investigation in the future.

Chemistry and chemical engineering have played little or no part in the industrial development of this industry, and the credit for its present accomplishments must be given to the mechanical and industrial ingenuity of its engineers and executives. With the exception of moisture determinations with the Brown-Duvel apparatus, and occasional analyses of the byproducts, laboratory methods have very little part in the daily routine in a modern rice mill.

However, it will be interesting to watch developments within this industry during the next decade, and compare its industrial development with its present status.

Leveling Seasonal Oversupply by

FREEZING GEORGIA PEACHES

By C. T. BAKER
Consulting Engineer, Atlanta, Ga.

PROBLEMS of flooded markets, oversupply, and the resulting drop in prices that have, in recent years, changed the growing of Georgia peaches from a highly profitable business to a somewhat unprofitable one arise primarily from the necessity for disposing of the entire crop in a few weeks' time.

During normal years, between 13,000 and 15,000 cars of peaches must be shipped out of the state as fast as the fruit ripens. When there is a bumper crop, the selling price generally declines so sharply toward the end of the six-week period that the grower oftentimes is forced to take a loss.

Studies made periodically for some years past indicate that it is not commercially practicable to place the Georgia peach in cold storage to be held for off-season sales, because the very varieties that are most desirable do not seem at all adapted to even comparatively short carry in cold storage. Moreover, they cannot be canned successfully. Cutting down a part of the orchards had until recently seemed the only possible remedy.

Fig. 2—Most of the peaches arrive at the plant by truck in the field crates

Probably the first individual in the state to recognize the possibilities in quick-freezing of peaches was W. R. Tucker, agricultural development agent for the Atlanta, Birmingham & Coast Railroad, who for a year or so previous to the establishment of the Georgia plants had been conducting experiments which convinced him that

Fig. 1—Built in record time to operate on the 1930 crop, this building at Montezuma, Ga., houses the peach-freezing plant of Tom Huston Frozen Foods, Inc.

the Georgia peach could be subjected to rapid-freezing methods without destroying the original taste, flavor, and appearance of the peaches.

Although for some years it has been a fairly common practice in the Pacific Northwest to freeze strawberries and other berries grown in that area, these products have been prepared for use chiefly by ice cream manufacturers, confectioners, and bakers. They have not been of a type suitable for family or individual consumption. The two Georgia plants built as a consequence of this work represent one of the first steps in freezing fresh fruits to be distributed to the consumer for table use.

During the spring of this year, Tom Huston Frozen Foods, Inc., began the construction of a $100,000 plant at Montezuma, Ga. The building, as shown in Fig. 1, is 60x200 ft., constructed of brick, reinforced concrete, and steel. It was built in 40 days from the letting of contract, in an effort to get into production on the 1930 crop.

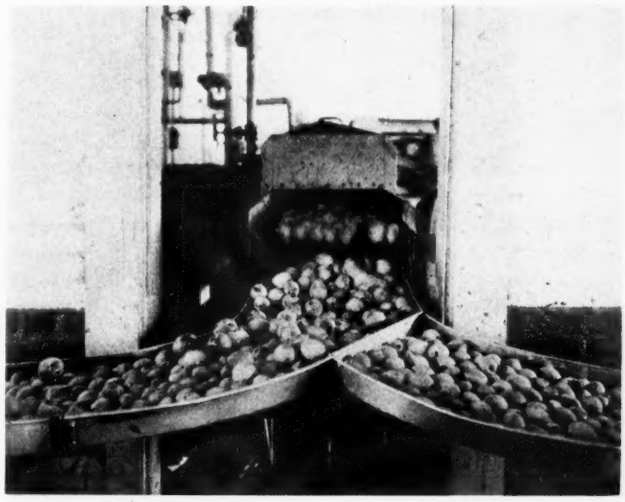


Fig. 3—From the peeling machine, the peaches pass through a wall opening to the processing room

Tree-ripened peaches are delivered to the freezing plant from orchards by trucks and unloaded at the receiving platform, as shown in Fig. 2. Fruit from distant orchards is received in refrigerator cars and also unloaded direct to this platform, which is served by a spur track.

The field crates of peaches, as they are received, pass from the unloading platform to the sorting and grading room. Here the fruit is passed to a Skinner grader, and the sound fruit delivered by means of a conveyor to a Dunkley peeling machine that completely removes the peel before the fruit is ready for the next stage in the process. The peeling machine consists essentially of a vat containing a weak solution of caustic soda. The fruit is passed through this solution at a rate slow enough to insure the complete loosening of the peel, and is then delivered to the washing section of the peeler. Here it comes in contact with a jet of cold fresh water that removes any of the peel not previously removed and at the same time washes the lye solution from the fruit.

Fig. 3 shows the peaches leaving the peeling machine and passing through a wall opening to the processing room. Here they are removed from the conveyors and delivered to work tables to permit seed removal. After the seeds are removed, the peaches are delivered to the Sprague-Sells slicing machine shown at the right of Fig. 4, which automatically slices the fruit ready for packing in cartons. The polished metal tubing shown suspended overhead conducts the sugar sirup from the mixing and fore-cooling tank to the filling stands. Small hand-filling nozzles here deliver the sirup to the containers in which the correct quantity of fruit has previously been placed. The sirup is made of hot water and sugar having a ratio of 29 lb. of sugar to 300 gal. of water and is precooled to about 40 deg. F. before being placed in the cartons of peaches.

After the cartons have been filled to capacity with fruit and sirup, they move by conveyor to the sealing machines, a small one being shown in the foreground of Fig. 5. After sealing, the cartons are removed from the conveyor and placed in wire baskets. The time between the placing of the fruit on the grader and its entrance to the freezer in cartons is estimated at approximately fifteen minutes. The speed of this process is most important to prevent oxidation and discoloration of the fruit before it reaches the carton.

The final workroom operation is shown in Fig. 6. Here a basket of $\frac{1}{4}$-lb. cartons is shown ready to enter the freezing room for placement in the freezer tunnels.

Fig. 4—A section of the processing room, showing slicing, packing, and siruping apparatus

Fig. 6—Left: A basket of ¼-lb. cartons about to go to the freezing room

Fig. 7—Right: Removing the baskets of frozen "Frosty Morning" peaches from the freezing tunnels. The tunnels, equipped with gravity conveyors, are five tiers high and 26 ft. long

The wire baskets used as shown in the illustration are 20 in. long, 15½ in. wide, and 8½ in. deep. When freezing 1-lb. packages, the cartons are placed two layers deep.

Going directly from the workroom, the baskets of cartons enter a series of five small narrow rooms, or tunnels, approximately 30 ft. long by 12 ft. high and wide enough to allow ample basket room with air space on either side. Air at high velocity and at a temperature of from 30 to 35 deg. below zero, F., is circulated by means of a motor-driven fan having a capacity of 28,000 cu.ft. of air per minute. The tunnels are equipped with gravity conveyors, arranged five tiers high and approximately 26 ft. long. They are cork insulated and built inside the main refrigerated storage room, which is approximately 68 ft. long, 46 ft. wide, and 12 ft. high, and also cork insulated.

Refrigeration of the tunnels is obtained by circulation of air over CO_2 evaporating coils located above the conveyors that support the upper tiers of baskets. The time of freezing is determined by the size of package used. Fig. 7 shows baskets of the peaches being removed from the tunnels. They are then packed, sealed in cardboard boxes, and stored in the large cold storage room at a temperature of from 8 to 10 deg. F. maintained by means of ammonia evaporating coils supported from the room ceiling on suitable coil supports. To avoid temperature changes as they leave the plant, they are passed to the refrigerator cars through a portable, insulated tunnel.

The refrigerating plant is electric driven throughout and consists of a combination of an 80-ton ammonia and a 45-ton CO_2 compressor connected to a common crankshaft, with the driving motor mounted on the shaft between the two compressors (see FOOD INDUSTRIES, Sept., 1930, page 410).

The plant was designed to handle and freeze 40,000 lb. of sliced peaches per day of 24 hours. The frozen peaches are shipped in selected Fruit Growers' Express refrigerator cars cooled by means of salt and ice to a temperature of 13 to 15 deg. F. before loading and are re-iced at authorized icing stations en route.

A laboratory investigation to determine the exact effects of the freezing process upon peaches frozen at the plant during the summer is now being conducted in Philadelphia by Dr. J. Cecil Rhodes, director of the Medical Arts Laboratories.

The first phase of the investigation will include tests to determine the comparative food value, solid content, fruit sugar content, and flavor of the frozen fruit and fresh peaches of the same variety purchased in produce markets. A second phase of the investigation will go into the matter of vitamin content. Rapid extension of the quick-freezing process to a wide variety of fruits, according to Mr. Huston, forecasts a revolution in the American diet comparable to that ushered in by the invention of the refrigerator car.

Fig. 5—Conveyors take the waxed cartons to and from sealing machines

IMPROVING CACAO BEANS

By Extraction

By GEORGE DEFREN
Consulting Chemist
Newton, Mass.

CACAO beans of commerce are obtained from the raw bean which lies embedded in a mass of pulp in a pod. The pods are broken up and the seeds or beans removed. Some of the pulp remains attached to the bean. The bean and pulp are "sweated" or fermented to decompose much of this pulp. The sweating produces various fermentation products, such as acids, both volatile and non-volatile, some of which are formed in, and also absorbed by, the bean and remain therein on drying. During the fermentation process the enzymes present in the bean also are active, affecting the carbohydrate, protein, glucoside, and other constituents. After fermentation, the beans are dried, generally at a low temperature, and are then ready for the market.

The commercial bean, as above prepared, contains a kernel, inclosed in a shell, or skin, that adheres more or less tenaciously to the kernel. Portions of the shell are attached so strongly that they are not removed by the usual winnowing processes and so pass into the cocoa products as an impurity.

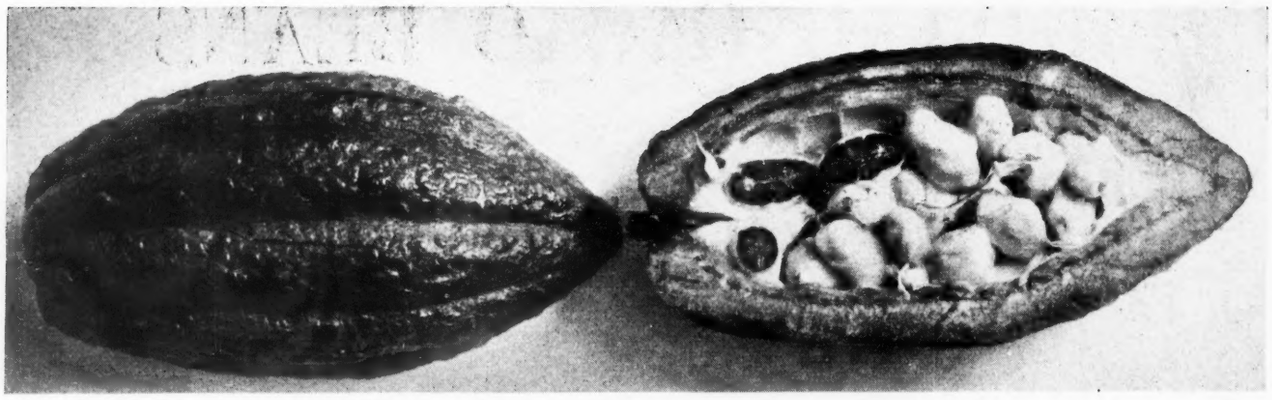
The bean, ordinarily, is not used in its raw state but is roasted at a temperature upward of 100 deg. C. for a suitable time to remove moisture and some of the volatile acids and to develop the aroma. The roasted bean is then cracked and subjected to a blast of air, or winnowed, to remove the shell. The broken kernels, or nibs, are then finely ground, forming "chocolate liquor" if the cocoa butter, which comprises about 50 per cent of the nib, is left therein; or "cocoa" or "cocoa powder," if a large proportion of the cocoa butter is removed. The raw, unroasted, bean is acid, acrid, or bitter. The acid and bitter qualities vary with the types of bean, the conditions under which they are fermented, and the localities in which they are grown. Some beans are less acid and bitter than others, and command higher prices, because the chocolate liquor or cocoa powder made from them has a more desirable flavor.

The acid, acrid, and bitter constituents of the beans comprise various acids, such as acetic, lactic, tartaric, tannic, and the like, together with various salts. Some of the acid constituents are volatile and can be driven off more or less during the roasting process. The bitter constituents are relatively non-volatile, consequently they are not appreciably affected by the average roasting process, especially if carried out at low temperatures. The roasted bean, therefore, contains about all of its bitter and part of its acid constituents. As a result, the chocolate liquor and cocoa powder made from many varieties and grades of cacao beans are inferior in taste and flavor because of the large proportion of the acid and bitter constituents that they contain.

CACAO TREE, showing many pods ready to be harvested

Previous experience in malting and brewing technology led to my investigating the fundamentals of the fermentation and roasting of cacao beans. It occurred to me that the underlying principles of malt mashing in the brewing and grain-distilling industries could be utilized in the treatment of cacao beans.

The fermentation of cacao beans has certain resemblances to the germination of barley for the production of malt; with the additional function, however, of removing as much as possible of the adhering pulp, which is not a problem with barley. In both cacao bean fermentation and barley germination the primary object is to change the internal characteristics of the seed. The process of germination is present also during cacao bean fermentation, although such germination generally is overlooked. Given the right conditions



A WHOLE CACAO POD beside a pod split to show the beans with their surrounding bed of pulp

of moisture and temperature, all grains germinate, because that is nature's method of propagating, or perpetuating, their kind. Those conditions of moisture and temperature are present in the fermentation of the cacao bean, and the enzymes which nature places in all beans or seeds, function true to type. Both fermentation in cacao beans and germination in barley are arrested by the action of heat and drying, which remove the moisture and make the beans or grains marketable.

It was found that cacao beans contain diastatic, proteolytic, and other enzymes, as was the case with malt. They also contain starch, protein, cellular tissue, volatile and fixed acids, as does malt; but, in addition, they possess "cacao red," acrid and bitter principles, and their own characteristic flavoring materials as well as special enzymes to disintegrate the complex organic compounds not present in barley or malt.

For brewing, or grain distillery purposes, the malt kernels are crushed, and then mixed with about five times their weight of water at appropriate temperatures for a sufficient period of time to permit advantageous functioning of the enzymes in hydrolyzing the starch, proteolyzing the albumin, disintegrating the cell walls, and causing other similar changes. These changes produce soluble products which go into solution in the water, forming the ordinary "wort." This is separated from the hulls and insoluble portions by draining through perforated plates, or false bottoms, in the mash tubs.

It is convenient to treat the whole bean rather than the nibs even if the process is prolonged, due to slower penetration of the water through the cell walls by capillary action, or osmotic pressure, and the accompanying slower chemical activity of the enzymes present. Water at ordinary temperatures will dissolve some of the constituents of the cacao bean. In some places a second-stage fermentation is practiced with water at room temperatures. Bacterial action necessarily follows, often producing more acid. The beans are then slowly dried at about 45 deg. C. and stored until needed for roasting. The process of distilling cacao beans with steam vapor at low temperatures removes some of the volatile acids, such as acetic acid, but does not remove the fixed acids, the acrid compounds, or the bitter principles.

When whole or fermented raw cacao beans are treated with from three to five times their weight of water at 60 to 70 deg. C., as was the crushed malt in brewing operations, and processed for a sufficient period of time, much of the starch breaks down into soluble dextrines and maltose; the protein is changed to peptones, albumoses, amides, amino acids; and the cell walls are acted upon by the cytase and other enzymes. These soluble degradation products, as well as the mucilaginous material which cements the shell to the nibs, are dissolved. The tannins, bitter principles, cacao red, and other soluble constituents diffuse through the cell walls of the nibs and shell by osmosis into the surrounding water. The concentration of the soluble constituents increases until the water holds as much material in solution per unit weight as remains in the cacao bean. By draining off this water solution and replacing it by fresh water extraction continues, subject to the law of diminishing returns. The extraction may be carried out in a diffusion battery analogous to that for extracting sugar beet chips; or in a continuous diffusion type of apparatus. When extracted to the limit, a bean can be obtained from which about all soluble substances have been removed. Practically all of the components which give the characteristic choçolate flavor would also be removed and a mild, bland, inert bean would remain (patents issued and pending).

It should be mentioned that in this treatment with hot water under the conditions specified, no cocoa butter diffuses through the cell membrane or shell, as might be expected, and that this enzymic action and extraction under brewing—"mashing"—conditions produces far more extractives than can be obtained by cold water or second-stage fermentation treatments. The latter is interesting, because mashing temperatures are generally too high for any ordinary fermentation action as generally understood; yeast is rendered inactive above 50 deg. C.

It is well to note that maintaining the beans and water at high temperatures, such as near the boiling point of water, has a tendency to give a cooked taste to the bean residue, which is undesirable. The conversion of the contents of the bean can be carried to any desired extent, which can be determined in practice by breaking open a wet bean and tasting its contents or by scientific control. When sufficiently exhausted, the beans are drained and sparged with water, as in mashing operations, and dried as rapidly as possible in any convenient manner until the shells are at least hand dry, so that the beans will not mat together. This drying should be uniform. If some beans are wholly dry while others are still decidedly wet, good results cannot be expected. In this treatment practically all of the mucilaginous material which cemented the shell to the nibs is dissolved and extracted by the hot water, leaving the shell free from the nib.

Drying and roasting makes each bean the equivalent of a steam boiler, as already described in a previous article (FOOD INDUSTRIES, Vol. 2, p. 248), only to a more pronounced degree, due to the presence of a larger percentage of water in the bean. The steam produced by this process, which is developed from the water in the interior of the kernel, forces the shell away from the nib and frequently cracks the shell. Further drying forms a brittle shell while the nib continues to contract until there is no firm contact between the shell and the nibs. This drying and roasting treatment can be made a single continuous process by proper selection of equipment.

If the drying and roasting process is not carried out properly, a pronounced "dish rag" taste is apparent; if permitted to remain wet too long before drying, the beans have a tendency to become moldy. Correct manipulation avoids these results.

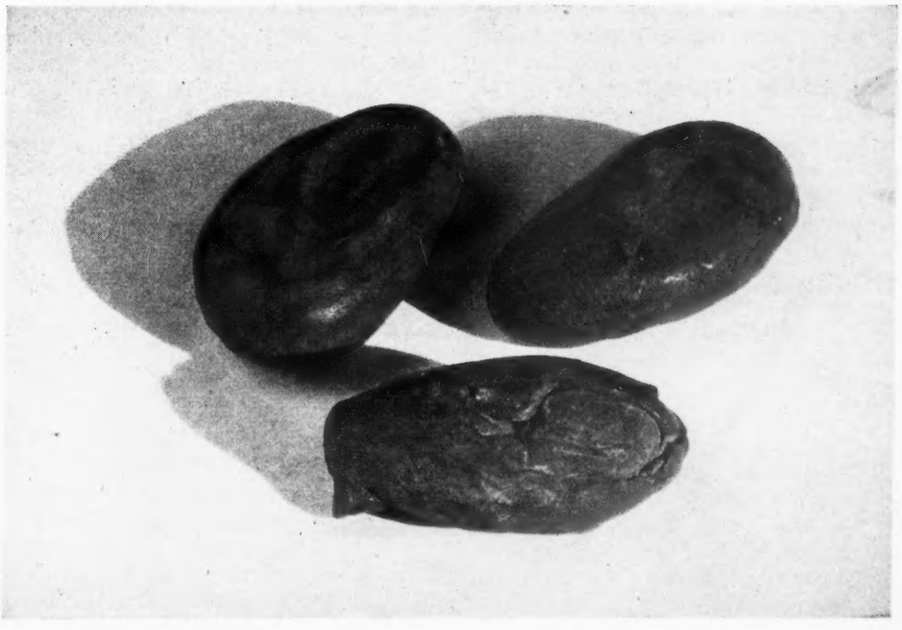
When sufficiently dry or roasted, the processed beans are winnowed in the usual manner. It should be of interest to note in this connection that, with a reasonably efficient apparatus and manipulation, the processed nibs are practically free from shell. Not only is the mucilaginous material, which cements the shell to the nib, dissolved, and removed by the surrounding water but the same water extracts much, if not all, of the soluble constituents of the shell. Consequently, the shells, when freed from the nibs by winnowing, are lighter in weight than the shells of beans not so processed, and are separated from the nibs much more easily and more completely, as might be expected. Furthermore, the processed nibs contain an appreciably higher percentage of cocoa butter per unit weight of nib; this is also true with the liquor made from them. This again is logical. Since no cocoa butter diffuses through the cell walls, and since the soluble constituents in the beans go into solution to be removed by the surrounding water, the cacao mass content—the non-fatty portion of the bean—gradually decreases and the percentage of cocoa butter increases. Had the cacao mass been entirely soluble in water, this process would have been the cheapest method of producing cocoa butter. Of course, the treatment outlined requires a larger weight of raw beans, to give an equal weight of liquor, but the results more than warrant the effort.

The utilization of the extracted material from the cacao beans is of considerable industrial importance.

By this treatment, the writer has raised the percentage of cocoa butter in liquor made from Accra beans from 54.5 to 65 per cent. True, the 65 per cent cocoa-butter liquor was exceedingly mild—in fact, practically bland—and had very little chocolate flavor. It was, however, a bland neutral base to which any flavor, such as milk or liquor from higher priced beans, could be added to get a product with the desired flavor from essentially cheap beans. Also the quantity of foreign flavor, such as vanilla, could be cut down to a great extent; often to one-half or even to one-quarter of former requirements. This was possible because there was less rank or bitter flavor to mask. The liquor obtained by the above process is more fluid than is a liquor made from the same unprocessed beans. This is due to the increased percentage of cocoa butter in the liquor from the treated beans. For instance, a liquor made from Accra beans in the usual manner had a viscosity of 48 seconds, but a liquor processed as above, from the same lot of beans and possessing 61 per cent cocoa butter, showed a viscosity of only 21 seconds, using the McMichel viscosimeter at 130 deg. F.

It was observed that the liquor from the processed beans was, as a whole, considerably finer in appearance under the microscope than was the liquor from untreated beans which had been ground under exactly similar conditions. This is due to the fact that the enzyme, cytase, had attacked the cell walls of the wet cacao beans, weakening them, and also to the fact that soluble materials had diffused from the cells through the cell walls. When subjected to grinding action, the cellular tissues easily broke down into fine particles—a desired objective in chocolate manufacture. In addition, it should be noted that in drying and roasting cacao beans, processed as outlined, a "low roast" should be the goal. Being mild and very friable, such beans would be just as sensitive—or even more so—to a high heat as is the bean of finer quality. "Over-roasting," or even burning, easily results.

TYPICAL CACAO BEANS of commerce enlarged to about twice natural size



or a "peanut taste" develops if care is not taken to roast correctly.

There is no incentive to give high-grade beans, such as the high quality Arriba, Java, Ceylon, or the higher grades of Caracas, the treatment suggested for low-grade beans, such as beans from Mexico, Central America, Africa, Brazil, or the West Indies, unless the lot happens to be rank or bitter, as sometimes occurs. As a rule, the high-grade beans possess not only the natural advantage of soil, climate, and pedigree but they also have intelligent treatment during the so-called fermentation and drying stages at the plantation. There can be no objection to giving even high-grade beans enough processing to dissolve the mucilaginous material cementing any adhering shell, in order that the shell may be entirely removed in subsequent drying or roasting. Incidentally, water-soaking removes most of the acid, especially acetic, and further removal is accentuated by volatilizing in drying or roasting. This becomes an important factor in the "conching" process as now practiced. It is logical to state that processing and drying or roasting the raw cacao beans for the removal of any disagreeable rank volatile acids leave less of this pungent material to be eliminated by conching or other subsequent treatment.

Because cacao shells are much more difficult than liquor to grind to an equal state of fineness, the manufacturer of high-quality coatings will not overlook the merits of such an advantage, even if he has a little more water to evaporate from his beans when roasting them.

The majority of cacao beans as they arrive in this country are decidedly rank and bitter, and require the addition of over 100 per cent of sugar by weight to make the coating palatable. The same beans, processed as above, require the addition of less sugar, the more the acrid and bitter principles are removed by extraction. The completely extracted beans require less than half as much sugar to make a sweet coating. However this coating has little chocolate taste or flavor.

Cacao beans can be so processed that it is unnecessary to add any cocoa butter to the liquor. A coating suitable for any desired purpose can be produced at a lower cost by regulating the percentage of sugar in relation to the cocoa mass and cocoa butter content of the liquor (FOOD INDUSTRIES, Vol. 2, p. 399).

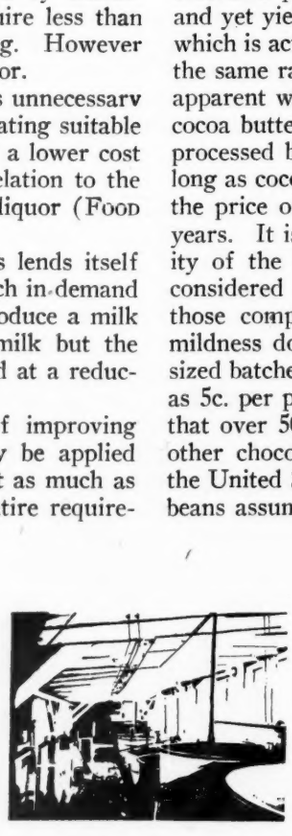
Liquor made from processed cacao beans lends itself to the manufacture of milk chocolate, so much in demand at the present time, in such a way as to produce a milk chocolate that has not only the taste of milk but the flavor and snap of chocolate in addition, and at a reduction in cost.

The above description of the process of improving cacao beans indicates that the process may be applied advantageously in two degrees: first, extract as much as desired of the bitter principles from the entire requirement of cacao beans, while still retaining sufficient chocolate flavor to make an acceptable coating; or, second, extract to the limit, to produce a bland liquor, and add to this bland liquor as much flavor liquor made from unprocessed beans as may be desired. Any volatile acids or unwelcome flavors inherent in this unprocessed liquor would necessarily be diluted by mixing with the bland liquor, leaving less of such undesired flavors to be removed by subsequent processes. Complete extraction of the beans yields greater efficiency per unit type of apparatus employed.

It has been demonstrated that a liquor made from thoroughly extracted Accra beans can hardly be distinguished—as far as flavor and aroma are concerned—from a liquor made from Maracaibo, Caracas, or other high-grade beans, likewise thoroughly extracted. In other words, the fundamental constituents—cocoa butter and cocoa mass—are essentially alike in all cacao beans. This situation is comparable to humanity: strip off the skin from a Caucasian, a Mongolian, a Negro, and it will be found that the flesh and bones are similar. It is just as logical to extract rank and bitter principles from inferior cacao beans, so called, as it is to remove grime from garments otherwise fundamentally valuable.

The process as outlined will call for a larger weight of raw beans to produce a unit weight of coating as now produced, but as the production of low-grade beans is increasing by leaps and bounds, it appears to be a fair conclusion that the supply of such beans will be ample for trade requirements. The economic outlook for the higher grade beans would seem to indicate a lowering in relative prices, because a smaller quantity of such beans would be needed for equal or better results.

At first sight, it seems rather unusual that any considerable percentage of a raw material can be removed and yet yield a product—in this case, chocolate coating—which is actually cheaper than another coating made from the same raw material, but not processed. This becomes apparent when it is realized that an expensive product—cocoa butter—must be added to the liquor from the unprocessed beans. This lowering in cost will continue as long as cocoa butter sells at two and a half to three times the price of whole raw beans, as has been the case for years. It is difficult to fix a value on the improved quality of the coating made by processing—if mildness be considered an improvement; but at least the verdict of those competent to pass on the subject indicates that mildness does constitute an improvement. Commercial-sized batches have shown a saving of from ½c. to as much as 5c. per pound of chocolate coating. When it is noted that over 500,000,000 lb. of chocolate bars, coating, and other chocolate products are manufactured annually in the United States, the economic value of improving cacao beans assumes considerable importance.



CHAINS—BUT NOT FETTERS

By O. FRED ROST

AMERICAN business at large (the food industry excepted) and the consuming public have been but vaguely conscious of the fact that under their very eyes there has developed in the field of distribution an institution that is perhaps as distinctly American as is the Declaration of Independence.

Chain systems for retailing merchandise were the obvious remedy for a generally wasteful, always cumbersome, frequently deplorably inefficient method of getting consumer goods from the producer or manufacturer to the consumer. Rapid expansion of chain systems crowded out many hundred inefficient merchants, forced other hundreds to become more efficient, and created in the minds of many of the remaining independents the idea that the continually growing chain store competition needed more than merely individual competition, and that co-ordinated co-operative effort was needed in order to preserve for each of them their individual independence.

The American Institute of Food Distribution recently issued a booklet containing the results of a comprehensive survey of voluntary chains. From the information contained therein and from data available from other sources, this brief summary of the situation has been prepared.

The so-called voluntary chain was designed to give individual enterprise and initiative the utmost freedom of action, but at the same time make available to each individual merchant the benefits that accrue from combined purchases, adoption of uniform and sound merchandising practices, co-operative sales effort and advertising.

Latest available statistics show that there are over 550 voluntary chain groups in existence, with a membership of upwards of 59,000 retail merchants. Having found their origin in two distinctly different motives they remain divided, approximately equally, in two distinctly different groups; the one organized and managed co-operatively by the retailers themselves through headquarters organizations of various types, the other sponsored by some progressive wholesaler who saw his market, the retailers, being continually more constricted through chain store competition, and then organized and "mothered" groups of retailers, built them into successfully operating retailer-owned chains in order to preserve for his wholesale operations a satisfactory volume of business and a definite future.

Among the voluntary chains the Independent Grocers Alliance constitutes an outstanding example because it is unquestionably one of the giants, and has served in many instances as the example after which other voluntary groups have been patterned. In it 58 wholesalers and over 10,000 retailers co-operate under a clearly stipulated plan of procedure; the retailer pays to the wholesaler $3.50 a week for the privilege of membership, receives advertising co-operation and special store management service. He must agree to concentrate his buying through the I.G.A. wholesaler, maintain his store at certain minimum standards of efficiency, adopt certain plans of interior lay-out and painting as well as exterior appearance, and co-operate closely with the purchasing, marketing, and merchandising activities of headquarters.

The I.G.A. wholesaler aside from a fixed franchise fee pays $10 per year for each retailer in his territory, of which $5 is set aside for national advertising activities.

The co-operation extended by the I.G.A. to its members covers the entire field of retail merchandising right through from buying to the sales procedures, sales checks, etc. A Home Economics Department is maintained to create sales, arrange menus, compile recipes, etc.; and eight times yearly a national sales drive is conducted in all I.G.A. stores. This chain now claims annual sales of over $500,000,000.

Substantially similar in type are the Creasey Corporation with headquarters in Louisville, Ky. which operates over thirty wholesale companies in eleven states, with approximately 9,300 co-operating retailers; Nation Wide Stores Co. of Brockton, Mass., with eighteen wholesalers and about 2,500 retail members; the Red & White Stores in Buffalo, now reporting over 10,000 retail members; Clover Farms Stores, Cleveland, with over 2,000 retailers; United Purity Stores at Spokane, Wash., with over 1,200 retailers; and numerous smaller organizations.

Among the grocer-organized wholesaling and retailing groups the Frankford Grocery Company, Inc., Philadelphia, Pa., is an outstanding example. It has a membership of 1,600, annual sales of over $7,000,000 and because of the great operating economies possible due to the small area in which its members are located, and the very definite obligations it imposes upon its members, the operating overhead is unbelievably low.

Members of this group are expected to buy stock approximating the estimated total of their weekly purchases, are not permitted to buy private labeled goods from other wholesalers, are expected to push all merchandise under the Frankford private label and must

pay for their weekly purchases each Monday or they cannot continue to buy on credit.

As may be expected, the voluntary chains created by wholesalers chiefly for selfish reasons exist under a variety of different arrangements, and in many instances are rather loosely held together.

Response to the various types of activity initiated at the wholesaler's headquarters depends upon the degree to which each individual retailer is willing to place his future in the wholesaler's hands, and results recorded by retail members vary greatly.

It has been demonstrated that concentration upon a limited territory is the best insurance for success of this kind of a voluntary chain, and one of the best examples of this type of development is found in the experience of R. C. Williams & Company, wholesale grocers, who have gradually built up a chain of nearly 400 retailers, each selected for his ability, experience, location, and financial standing.

This company follows very closely the best practices of the largest national chain store systems, gives its co-operating retailers the benefit of expert advice, arranges weekly sales at special prices and practically assures profitable operation by concentrating much attention on the question of turn-over, having raised the average turn-over of its members from less than ten times a year to over twenty times a year. An executive committee consisting of twelve member grocers co-operates with wholesaler in planning ahead.

The American Institute of Food Distribution has compiled some very interesting data on voluntary chains. For instance, while regular chains are estimated to secure from 35 to 40 per cent of the total obtainable sales volume (they have in fact been shown to secure over 50 per cent in many localities), the independently owned voluntary chains appear to be rapidly catching up and now account for 25 to 30 per cent of total sales volume in grocery stores.

Activity of independent grocers through chain co-operation clearly reached its highest development in those territories where regular chain stores have reached greatest penetration, so that New York State alone has fifty-two voluntary chain organizations with over 4,500 members; Pennsylvania has forty-seven with over 6,200 members; California has twenty-two with over 4,900 members.

Similarly, the rapidity of voluntary chain development has paralleled closely that of the regular chains in that it took a tremendous upswing in 1925, reached the peak in 1929 and since then has probably remained no more than stationary. Membership in voluntary chain organizations increased in somewhat parallel proportion to the growth of competition from chain stores.

The degree of co-operation prevailing in some of these voluntary chains may be measured from the results of a recent survey which showed that of sixty-eight groups giving specific figures, fifty-one made 75 per cent or more of their purchases from affiliated wholesale houses.

Important to manufacturers is the effect of voluntary chain distribution upon the market for nationally advertised brands, private wholesaler-owned brands, etc. At present there is evident a distinct trend on the part of the management of voluntary chains to fortify the position of their organization through the use of private brands. This holds true particularly in the wholesaler-sponsored group where of 105 organizations surveyed, 59 make definite comment, 22 reporting quite extensive use of private labels, 3 using them more all the time, 3 that they form 75 per cent of volume, 7 that 20 to 25 per cent of their business is on private brands.

Considering the fact that in the field of food distribution the trend toward voluntary chains is steadily growing, and where continuous operation will help to improve and increase the benefits that accrue to independent retailers through such association, manufacturers of food products must expect to employ this agent to a steadily growing extent in the distribution of their goods.

▼ ▼ ▼

Trend to "Whole Kernel" Corn Leads to Crop Experiments

PACKING sweet corn by the new "whole-kernel" method rather than by the usual cream style has led to a number of tests on the canning-crops farm maintained by the New York State Experiment Station at Geneva. These tests will serve to determine the comparative yields of numerous varieties when grown for the two styles of pack.

In all, 31 varieties of sweet corn are under test this season, and while definite yield records are not yet available, it is quite evident, according to C. B. Sayre, who is in charge of the canning crops work at the station, that the eight-rowed type of Golden Bantam sweet corn so long popular with the canner must give way to twelve- to sixteen-rowed varieties if the new method of packing becomes general. The chief advantage of the latter types is the deeper kernels on that type of ear.

The chief difference in growing corn for the whole-kernel method of packing over the present cream style pack is said to be the date of harvesting the crop. For the new style of pack, the corn is harvested at about the time when it is best for table use—that is, when the sugar content and moisture content are high. For the cream style of pack, corn is harvested several days later, when it has become drier and has a higher starch content. The earlier harvesting of the crop results in a much superior canned product, it is claimed.

The term "whole kernel" is quite descriptive of the new process, as the corn kernels are preserved in their original condition as they are removed from the cob, and resemble in many respects corn as cut from the cob in the home. It is the opinion of the station specialists that within a year or two farmers who grow sweet corn for the canning factory will have to decide whether or not they want to grow varieties suitable for the whole kernel pack or continue with the present methods and varieties for the cream style of pack. The experiments at Geneva this year are expected to yield very valuable information in regard to the best varieties for the new whole kernel pack. Also, these experiments will show comparative yields for each style of pack and number of cans per ton that the canner can expect to obtain from each method.

WATER PROBLEM SOLUTION

May Lie Underground

By E. W. BENNISON
Engineer, Kelly Well Company
Grand Island, Neb.

This article deals largely with the shallow type of well. At a later date, FOOD INDUSTRIES will publish articles concerning deep wells and city water supplies

WHEN one stops to consider the vital relationship between a satisfactory water supply and efficient operation in practically every food plant, the increasing importance given to this factor in determining plant location seems fully justified. But such was not always the case. The more obvious advantages of good transportation facilities, cheap property values, and accessibility to raw materials often have been given such paramount consideration that only after operations began was it discovered that the water supply was unsatisfactory or inadequate.

Realization of the correct importance of good water does not mean, of course, that every new food plant will be located within easy reach of an ideal water supply; neither does it mean that every plant now struggling along on an unsatisfactory supply will be abandoned for a more favorable location. It does mean, however, that a scientific study of the kind and quantity of water needed, and of the various methods of obtaining it, will be included when the pros and cons of plant location or improvement are considered.

In many cases, the logical answer to a satisfactory water supply will be found in the use of underground sources. In the last few years the use of underground water has been given the attention necessary to raise it above the "hit or miss" plane and base it upon a combination of good geology and good engineering.

Many of our large industries have adopted the policy of not purchasing real estate until they have had an underground survey made to determine the probable quantity of underground water that can be developed if necessary. Such questions as the rate and direction of flow, the quantity available in the water-bearing strata, the extent of the strata, the character of the water-bearing strata in their ability to yield water, the action of the water when pumped, its temperature, chemical analysis, and the danger of contamination, all interpreted as they affect the requirements of the users, are among those that must be investigated before the industrial use of underground water can be seriously undertaken. If it is found that a satisfactory supply is available, then the question of how to obtain the water presents itself.

By far the most common method of making an underground supply available is to sink one or more wells into it. There are other means, such as collecting systems, infiltration galleries, and underground dams, but these are all special problems that are treated as such.

A report of general geologic conditions, together with a study of existing wells in a locality, is sufficient to determine the type of well construction best adapted to the situation. By type of well, the builder refers to two general classes into which all wells are divided; namely, shallow wells or deep wells. Each has its advantages, and careful comparison, based on the specific location and requirements, is necessary to determine the most satisfactory type. As a rule, shallow supplies are better if they can be obtained, because the wells are less expensive to build and pump. Furthermore, because shallow wells are in the surface formations, they yield water that is generally much softer than deep rock wells.

Deep rock wells are always drilled, and depend upon the crevices and fissures in the rock formations for their supply. They are generally of small diameter and yield a hard water. Wells of this type are expensive to build and hard to maintain, but are made necessary in many cases by lack of water in the surface formation.

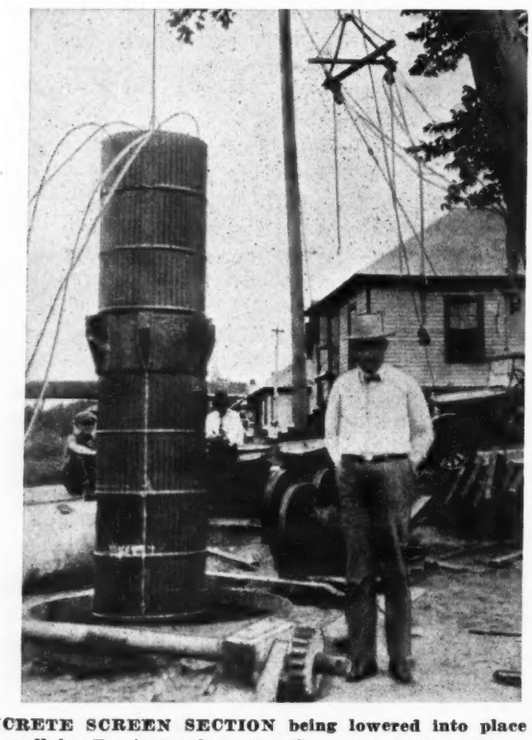
Shallow wells are driven, bored, or dug, depending upon the type of formation and the quantity of water required. These wells make use of water in the soft formations, such as sand and gravel deposits, alluvial deposits, drift, and the like, which lie above the basic rock formations.

The location of a well is as important as the method of construction, but it is often neglected in order to locate the well at some advantageous place around the plant. Often this has later required a change of plan to locate wells where the water is, rather than where the plant is. If the location of the best strata of water-bear-

A PUMP TEST on a well under construction for American Beet Sugar Company, Grand Island, Neb., showed an output of 1,240 gal. per minute with a "draw down" of 29 ft.

ing material are unknown, then a few preliminary test holes, if put down properly, will give sufficient information to locate the new wells properly. In drilling deep wells, a geologist's report is often times the only preliminary information available, and many holes are abandoned after several hundred feet of drilling because no water is found. Failures of this kind can be avoided in wells of the shallow type.

In putting down test holes, as in the construction of the well itself, hydraulic methods should be avoided. When these methods are used, the materials penetrated are washed out of the test hole and become so badly mixed up that samples do not give a true indication of the underground conditions. This is especially so in holes put down in sand and gravel, as here the coarser materials are separated from the finer, and the latter are washed out and lost. As the percentage of foreign particles is the controlling factor in the ability of a formation to transmit water, it is essential that the samples be taken out as they exist in the ground and that the thickness of each stratum be determined accurately. After comparing the results of several test holes, it is often possible to pick a location in which one well will furnish several times the quantity of water that could be obtained from three or four wells put down "hit or miss."



CONCRETE SCREEN SECTION being lowered into place at a well for Bemis Brothers Bag Company, Jackson, Tenn.

The type and location of a well being chosen, it is still necessary to determine its size or diameter, the depth, the method of construction, and the materials of construction to be used. For deep rock wells, ordinary black iron or steel pipe casing generally is used for such portion of the well as needs casing. Occasionally, where the water is corrosive, rust-resisting alloys are used. For shallow wells, many materials are used, including iron, steel, brick, wood, cement blocks, concrete, and vitrified clay.

The method of construction plays a large part in the future operation of a well, especially for shallow wells. It is a well-established fact that the method of building a well can influence its future performance by as much as 100 per cent. Recent experiments show that in stratified formations of clay, quicksand, sand, and gravel, the greatest supply is obtained when the ground formations are least disturbed during the construction work.

This means that all methods which include the use of pumps, churns, bailers, or other devices that will break up the natural formations should be avoided. It is also important that all methods that permit the formations in the vicinity of a well to cave, ravel, or break up during the building of a well should be avoided. In all well-building operations, an accurate record of the formations penetrated, together with their water-bearing ability, head, and quality, should be kept for future reference.

Every kind of well must be provided with openings in the casing through which water may pass into the well. The size and shape of these openings must be such that they will allow the maximum quantity of water to pass into the well with the least effort and without clogging, stopping up, weakening the screen or without passing particles of fine sand into the well during pumping. This portion of a well is known as the "screen," and the remainder is known as the "plain" portion, no matter what material is used in constructing the casing. When analyzed, nearly all well troubles are found to be screen troubles, due to the screens clogging up with sand or corroding from the chemical action of the water. When clogging cuts down the openings of the screen, the user, in order to maintain his water supply, pumps the well harder. This aggravates the condition, causing the screen to become entirely useless. In many cases, corrosion and sand clogging working together cause the total failure of wells. To overcome these troubles it has become the practice in recent years to build shallow wells of materials not subject to corrosion, such as concrete, and to protect the screens from clogging by placing a layer of graded gravel around the screen portion.

When a well is treated with gravel in this manner, the separation of water from the formations no longer takes place at the screens, as is the case in the ordinary type of well construction, but occur farther out at a point where the velocity of the approaching water is so low that it will not carry the fine particles of sand.

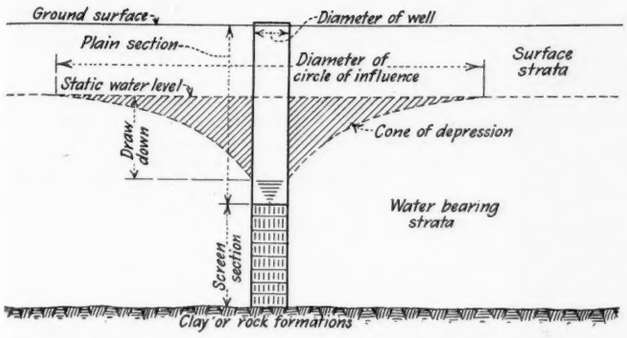
The yield of a well follows certain fundamental principles. In a water-bearing formation, it will be approximately proportional to the lowering of the water table which takes place under the pumping. This rule applies with safety up to two-thirds of the original depth of water, but beyond that point the yield decreases rapidly in proportion to the lowering. In any well not built in rock, the relations between draw down and yield, shown in Table I, will be found approximately correct.

Table I—Relation of Yield to Lowering of Water Table

Per Cent of Lowering	Per Cent of Yield	Per Cent of Lowering	Per Cent of Yield
10	18	60	85
20	35	70	92
30	51	80	96
40	64	90	99
50	76	100	100

The yield of two wells in the same location is proportional to the depth of the wells, assuming the water-bearing formations to be the same. The diameter of wells also affects the yield, though not in direct proportion, as is popularly supposed. Table II shows the relative quantities that can be obtained from wells of different diameters—everything else being equal.

An inspection of the Table II shows that not quite twice as much water will be obtained from a 20-ft. well as can be obtained from a 2-ft. well, even though one well be ten times larger in diameter than the other. This prin-



GENERAL PLAN OF shallow-well construction, showing "cone of depression" that exists during pumping

ciple as well as the fact that it is unsanitary and uneconomical to build, largely explains why the old large-diameter open well so popular 30 years ago is practically obsolete today. The diameter of a shallow well depends largely on the quantity of water available in the ground formations and the size of pump to be installed.

In connection with the yield of wells, the action of the ground water under pumping should be understood, so that wells will not be located so close together that they will interfere or rob each other when being pumped simultaneously. We know that when water is pumped

Table II—Relation of Yield to Well Diameter

Well Diameter (Inches)	Relative Quantity of Yield	Well Diameter (Inches)	Relative Quantity of Yield
4	1.0	48	4.6
6	1.5	60	4.9
8	2.0	72	5.2
12	2.5	120	6.0
24	3.6	240	6.9
36	4.2		

from a well, the water level in the well is lowered, and that water flows into the well from the surrounding formations at an increased velocity. The level of the water in the ground in the vicinity of the well takes the form of a curve, this depression in the water table being called the "cone of depression." It extends for practically equal distances in all directions from a well to the point where the influence of the well is not felt on the water table. The distance across the base of this "cone of depression" is diameter of that "circle of influence" of the well, and indicates the distance apart that wells should be constructed so as not to interfere with each other. If the well is built in a formation where the water-bearing sands are overlaid by impervious strata, then there will be no circle of influence until the static head is removed, but a curve of pressures can be plotted by measuring the decreasing pressure-head during pumping, and this curve closely follows the curve representing the ground-water curve. Some idea of the amount of interference and the diameter of the circle of influence as ordinarily encountered is given in Tables III and IV.

Table III—Interference of 6-In. Wells

(Radius of circle of influence 600 ft. when pumped down 10 ft.).

Spacing (ft.)	Interference (Per Cent) 2 wells	3 wells	Several in row
10	35	51	90
100	20	31	66
400	11	12	24
1000	6	8	8

Table IV—Radius of Circle of Influence

(Wells being pumped down 10 ft.).

Wells In.	Radius of Influence (ft.)	Diameter of Influence (ft.)
Coarse Gravel	500	1000
Coarse Sand	280	560
Medium Sand	200	400
Fine Sand	150	300
Very Fine Sand	100	200

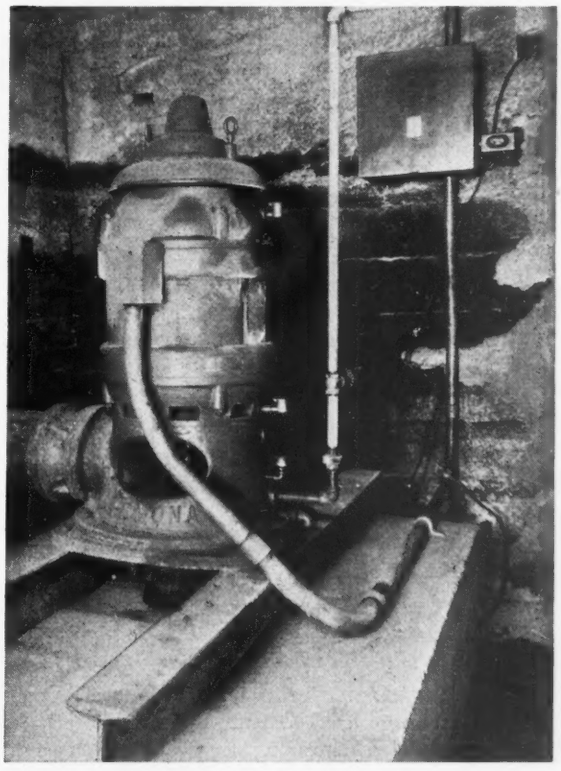
The condition in a shallow well under pumping is shown in the accompanying diagram. The distance apart that wells should be built is arrived at by using the diameter of the circle of influence as a minimum and then keeping the wells as much farther apart as the local conditions will allow.

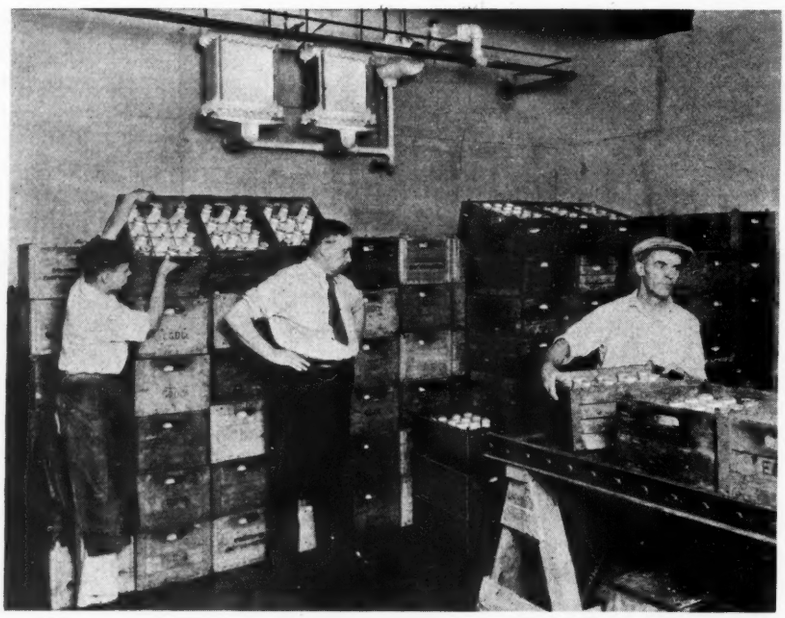
There are a number of methods used to increase the yield of old wells, such as removing and cleaning the screens, introducing gravel into and around the screens where possible, treating with acids, back-blowing with air, steam, or water, and even, in the case of deep rock wells, using explosives. All of these expedients have been found to be more or less temporary.

To sum up, the development of underground water by the use of wells depends on a good deal more than the building or drilling of a hole in the ground. It involves accurate knowledge of principles governing the occurrence of ground water, its movement through the ground, its action on materials, the hydraulic principles involved in separating water from the ground formations and the actions set up in the ground formations when their natural rate of flow is increased by pumping. If the wells constructed are scientifically correct in methods and materials, they should make 100 per cent of the water within their depth available for use.

When a plant owner wishes to provide himself with a dependable water supply or increase his present supply, he will do well to take advantage of the experience gained by others by calling in a reliable well construction company, maintaining engineers who are experts in the line of water development and pumping problems. The service of these men is available for the asking and many industrial plants that formerly got along the best they could with "home-made" wells are now provided with adequate and economical water supplies.

WELL HEAD and pump installation at Peoria Service Company, Peoria, Ill.





Storage room at the plant of the East Greenwich Dairy Company, showing the two unit coolers mounted on the rear wall. Note the contrast in size between these units and the pipe coils shown in the view of the filling room

H. E. McGRAW
Manager, East Greenwich Dairy Company
East Greenwich, R. I.

Tells How New Equipment

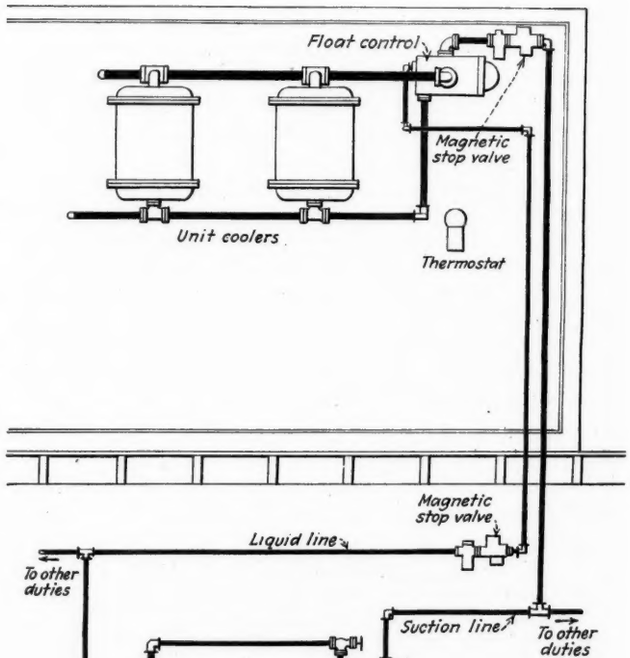
Improved Refrigerating Conditions

In the Storage Room

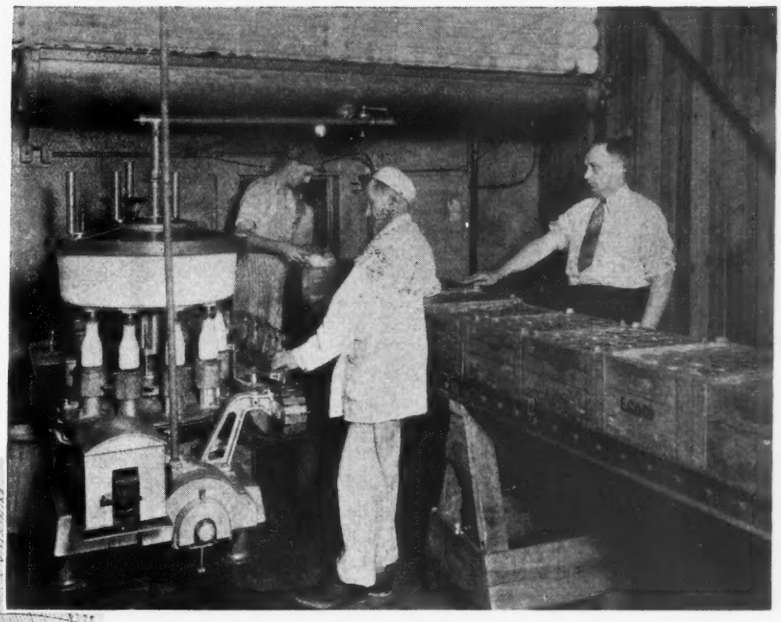
EAST Greenwich Dairy Company, East Greenwich, R. I., has installed a new milk cooling system which includes a refrigerating machine, direct-expansion milk cooler of 8,000-qt. capacity, and milk storage room. The latter contains the real innovation of the entire cooling system, inasmuch as it possesses the first installation of Grinnell unit coolers and Grinnell liquid level control in the world. These coolers replaced the conventional pipe-coil cooling system that was formerly in use.

Proper refrigerating conditions constitute a subject of vital importance to the milk industry, as well as to many other branches of the food industries. Throughout my 36 years in the management and operation of dairies I have noted the ways and means that have been sought to achieve what approximates a uniformity in temperature in rooms requiring refrigeration; to handle in a practical, efficient manner the defrosting process which is an integral part of refrigeration; and, generally, to provide more comfortable working conditions for employees engaged in refrigerated quarters.

Conditions exist in our milk storage room at the present time that we formerly considered purely theoretical. As a result of the air circulating feature of the unit coolers, condensation on milk cases, bottles, floor, etc., is absolutely avoided. This condition is so pronounced that the wearing apparel of our men is not even moistened or soiled when checking out. The circulation of cool air now permits us to place milk in the storage room at a much higher temperature than was ever possible in our experience with coil-cooled rooms; and tests have already proved that such a procedure has materially improved our bacteria count. An improved bacteria count obviously means a higher milk rating.

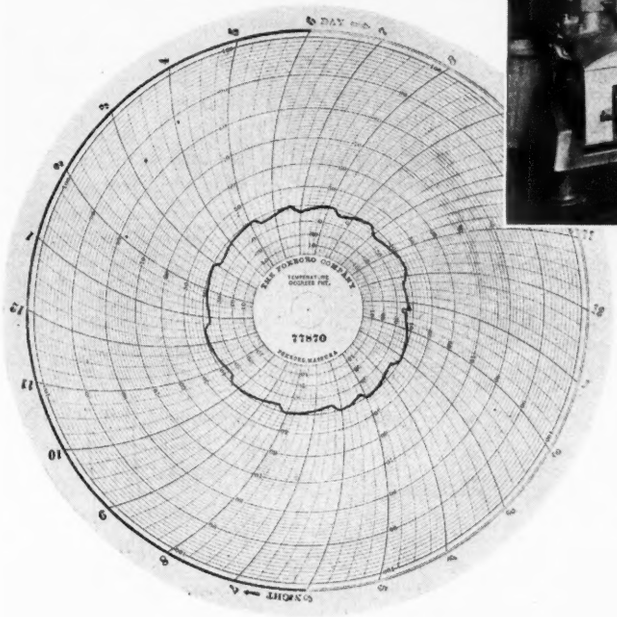


Diagrammatic layout of a cooling system using unit coolers and liquid level control



Filling room at the East Greenwich Dairy Company plant. Cases of filled bottles pass on the conveyor through the hole in the rear wall to the storage room shown on the opposite page

Chart from a unit cooler showing uniformity in the storage room when operating for 24 hours continuously, fluctuations being caused by defrosting periods



The milk storage room in this dairy is 25x25x12½ ft., constructed of 4-in. corkboard walls, ceiling, and floor. There are four cold-storage doors in the room: a standard 3x6-ft. door for entering and leaving; one 18x26-in. door for delivering milk into the room from the direct-expansion milk cooler and bottling machine; and two 18x26-in. doors on the opposite side of the room opening onto the loading platform for checking out milk to the wagons.

Installed in the cold-storage room are two unit coolers and one liquid level control. This equipment replaces the pipe-coil system that was used formerly. The unit coolers have a front face of 18x18 in. with a 9-in. depth. Their over-all dimensions, including drip pans, are 23 in. deep by 23½ in. wide by 42 in. high.

The loading of milk into the storage room gets under way about 7:30 a.m., at which time the refrigerating machine is placed in operation, together with the unit coolers. At the start the temperature of the storage room is about 50 deg. F., due to the fact that neither refrigerating machine nor unit coolers are operated during the night. Milk leaving the direct-expansion milk cooler is at 38 deg. F. The milk is bottled and the bottles are placed in cases, and by the time the milk reaches the storage room its temperature is about 46 deg. F.

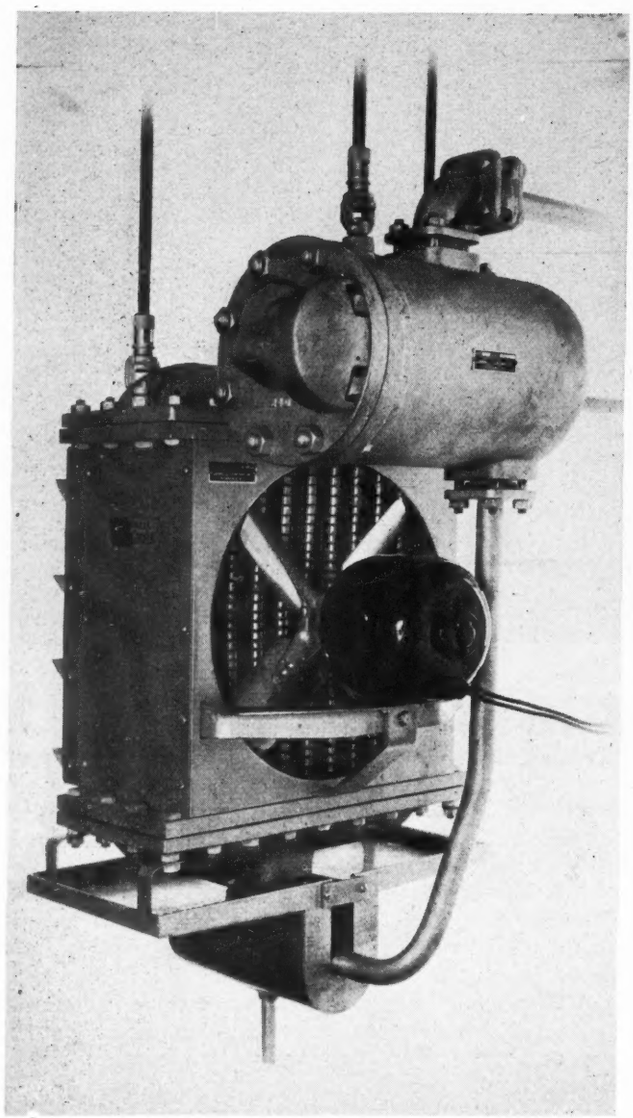
For three hours milk continues to be loaded into the storage room. By this time 8,000 qt. of bottled milk have been brought in. The room's temperature at the end of this loading period is 45 deg. F. Then, for a stretch of about 30 minutes, the refrigerating machine is closed down, to permit the unit coolers to defrost. This is an entirely automatic process, accomplished simply by allowing the air circulating fans, which are an integral part of the unit coolers, to operate continuously. A marked uniformity of temperature is maintained throughout the defrosting session.

After the shutdown the unit coolers are completely defrosted. The refrigerating plant is again set in operation for about an hour, during which time the temperature of the storage room and milk in it is reduced to about 37 deg. F. The refrigerating machine is stopped once more, until about 4 p.m., when it is again permitted to operate for an hour, reducing the temperature of the milk and room to 36 deg. F.

The refrigerating plant has now done its day's work. It is shut down for the night and not placed in use until 7:30 a.m. the next day, when activities again follow the procedure just described. It is interesting to note that the total operating time for taking care of 8,000 qt. of milk and the cooling room is approximately five hours a day.

In the milk storage room the refrigeration is manually controlled. However, this operation can be made entirely automatic with a room thermostat control, thereby eliminating the human element entirely.

The advantages that we have obtained from this new system may be briefly outlined as follows: First, the unit coolers provide quick cooling for the room and milk. Our records indicate that the temperature is reduced from 48 to 42 deg. F. within fifteen minutes after defrosting. Second, an even temperature is maintained in all parts of the cold-storage room, thereby eliminating the possibility of milk freezing in the bottom cases. Not a single bottle of frozen milk has come to our attention since the installation of this system. Third, fog, wet and generally sloppy conditions are entirely absent from the room. This is admirably illustrated in one of the photographs accompanying this article. This picture has not been retouched and the print shows an unmistakable clarity of atmosphere, since the exposure was made about noontime, soon after the room was filled. Fourth, the automatic defrosting process does away with the neces-



The new type cooler and level control used by the East Greenwich Dairy Company

sity of men chopping at pipe coils or employing other makeshift methods for achieving the results desired. Fifth, as a result of the automatic defrosting process, there is a complete absence of the disagreeable odors that are frequently identified with storage rooms. It must be remembered that formerly the pipe coils were defrosted perhaps once a month, or sometimes at greater intervals. Growths were produced in mushroom quantities and musty odors became more and more pronounced.

The automatic features of the system—automatic defrosting and automatic control of temperature conditions—are made possible through the use of the liquid level control, which maintains a predetermined level of refrigerant not only in the coolers but also in pipe coils, direct-expansion milk coolers, and similar equipment. The feeding of refrigerant is controlled directly by the action of a float riding in the liquid contained in the evaporator. By maintaining full level in the evaporator itself, a maximum of work is insured for every square foot of evaporating surface.

The design of the unit cooler generally follows the principle of modern water-tube boiler construction, for, after all, any refrigerating evaporator is nothing more or less than a boiler. There are no return bends or pockets in the unit that would favor gas-locking conditions. In addition, radiating fins and air circulation are features of the cooler that greatly increase the rate of heat transfer per square foot of surface. This condition results in the ability to provide a given amount of refrigeration in a much smaller space than required for pipe-coil installation. Forty-five feet of $\frac{3}{4}$-in. seamless tubing, which is equivalent to $\frac{1}{2}$-in. pipe size, on the unit cooler performs the same work formerly handled by about 600 lineal feet of ordinary 2-in. pipe coil in the system formerly used. From a surface angle, approximately 45 sq.ft. of tubing in the unit cooler performs the same work formerly handled by 400 sq.ft. of pipe in the pipe coil arrangement.

An idea of the capacity of the unit cooler may be gleaned from the fact that in this installation the total amount of actual refrigeration work handled by the two unit coolers approximates five tons. Each of these coolers is equipped with a 1/25-hp. motor consuming 98 watts. The layout of the system is shown in the accompanying sketch, while the reproduction of the recording thermometer chart shows the uniformity of temperature in the storage room when operating continuously for a 24-hour period.

This installation was put to the acid test during the extremely humid, warm weather in late August. The system proved itself fully capable of maintaining the necessary uniformity of temperature under these conditions. Also, the lack of fog and condensation was always in evidence.

▼ ▼

Legal Limitations of Sulphur Dioxide In Dried Fruits

The use of sulphur dioxide up to 1,250 mg. per kilogram (2.2 lb.) for the preservation of dried fruits imported into Hungary is now permitted, according to recent instructions issued by the Royal Hungarian Ministry of Agriculture. The instructions carry the provision that the goods must bear a mark indicating the presence of sulphur dioxide and its quantity, e. g., "Dried peaches preserved by ——— grams of sulphur dioxide per kilo."

In the United States there is no definite official limitation as to the quantity of sulphur dioxide that will be tolerated, but the attitude of the Food, Drug and Insecticide Administration is indicated by the following quotation from Food Inspection Decision 89, issued March 5, 1908:

"No objection will be made to foods which contain the ordinary quantities of sulphur dioxide if the fact that such foods have been so prepared is plainly stated on the label of each package.

"An abnormal quantity of sulphur dioxide placed in food for the purpose of marketing an excessive moisture content will be regarded as fraudulent adulteration, under the Food and Drug Act of June 30, 1906."

The following table indicates the legal limitation of sulphur dioxide in the European countries:

France	1,000 mg. per kilogram
Roumania	1,200 mg. per kilogram
Switzerland	1,250 mg. per kilogram
Hungary	1,250 mg. per kilogram
Great Britain	2,000 mg. per kilogram

Researches now being conducted by American manufacturers of dried fruits are endeavoring to find a method of preservation in which the quantities of sulphur dioxide used as a preservative are reduced to a minimum.

Changes in Consumption of

EDIBLE FATS

By E. G. MONTGOMERY
Chief, Foodstuffs Division,
U. S. Department of Commerce

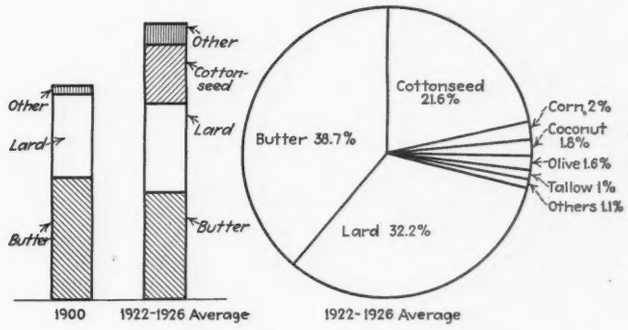


Fig. 1—How Consumption of fats and oil is divided

AN INCREASE of about 10 lb. per capita in the consumption of vegetable oils is one of the most striking changes in food consumption that has taken place in the past 30 years. Nor has this gain been at the expense of other edible fats. Consumption of butter has declined a small amount, but lard consumption has remained practically the same, about 14 lb., for the 30-year period. The average consumption for fats and oils, both vegetable and animal, has reached about 44 lb. per capita in recent years.

Table I—The Shift in Per Capita Consumption of Some Common Fats and Oils

	1900, Pounds	Average 1922–26 Pounds
Butter	19.9	17.2
Lard	13.2	14.3
Cottonseed oil	....	9.62
Other	1.5	3.34
Total	34.6	44.46

Vegetable oils, such as olive oil, corn oil, and cottonseed oil, were used in a limited way for salad dressings and cooking purposes at the close of the nineteenth century, but the total consumption at that time was probably not more than about 2 lb. per capita. With the discovery of methods for hardening vegetable oils, however, new uses were soon found, particularly in the manufacture of shortening compounds and margarins that use vegetable oils as part or all of the raw materials. The principal use is in the shortening compounds, which now amount to about 8 lb. per capita. About 94 per cent of such compounds are composed of vegetable-oil ingredients, cottonseed oil being the principal material used.

Margarin, which at one time was made almost exclusively from animal fats, now contains from 50 to 60 per cent vegetable oils on the average, some margarins being made almost entirely from products of vegetable origin. The principal oils used for this purpose are coconut oil and cottonseed oil. The increased use of these oils apparently is for cooking purposes rather than as a spread for bread. About 90 per cent of the margarin manufactured is uncolored, and a large part of it probably is used for cooking. Naturally, most of the out-

Table II—Factory Production of Animal and Vegetable Fats and Oils in the United States*

Fat or oil	Year Ended June 30, 1913, (a) 1,000 lb.	1925 1,000 lb.	1926 1,000 lb.	1927 1,000 lb.	1928 1,000 lb.	1929 1,000 lb.
Cottonseed, crude	1,455,501	1,510,802	1,764,318	1,806,757	1,460,469	1,584,361
Cottonseed, refined	....	1,345,461	1,471,369	1,592,889	1,330,764	1,450,772
Peanut, crude and virgin	454	15,156	10,644	10,590	12,439	16,130
Peanut, refined	....	8,332	8,372	8,512	9,546	10,680
Coconut or copra, crude	31,729	207,604	260,712	281,654	311,181	352,654
Coconut or copra, refined	....	197,118	231,236	243,094	295,909	334,567
Corn, crude	73,832	104,153	120,041	117,441	124,327	133,680
Corn, refined	....	79,624	93,704	92,871	104,487	121,450
Soybean, crude	....	2,520	2,646	3,088	4,716	11,009
Soybean, refined	....	....	7,253	5,681	7,441	7,831
Olive, edible	966	532	1,383	858	1,438	1,003
Lard, neutral	....	46,629	46,423	48,116	52,991	43,508
Lard, other edible	....	1,506,892	1,578,925	1,608,195	1,799,976	1,813,354
Tallow, edible	....	50,215	58,284	48,892	41,047	43,727
Lard compounds and other lard substitutes	....	1,152,620	1,140,708	1,178,995	1,143,349	1,220,101
Oleo oil	....	141,366	161,427	127,594	124,105	122,527
Animal stearin, edible	....	73,955	79,490	67,325	61,262	59,753
Lard oil	....	35,450	28,615	26,688	22,161	29,855
Oleomargarin (b)	145,228	248,047	257,157	294,699	333,122	....
Hydrogenated Oils	....	....	....	505,292	578,470	656,438

*Compiled from reports of the Bureau of the Census, except 1913, by "Foreign Crops and Markets," U. S. Department of Agriculture, except 1929 figures, taken directly from "Animal and Vegetable Fats and Oils," Bureau of Census.

(a) Bureau of Chemistry.
(b) Annual report of the Commissioner of Internal Revenue, year beginning July 1.

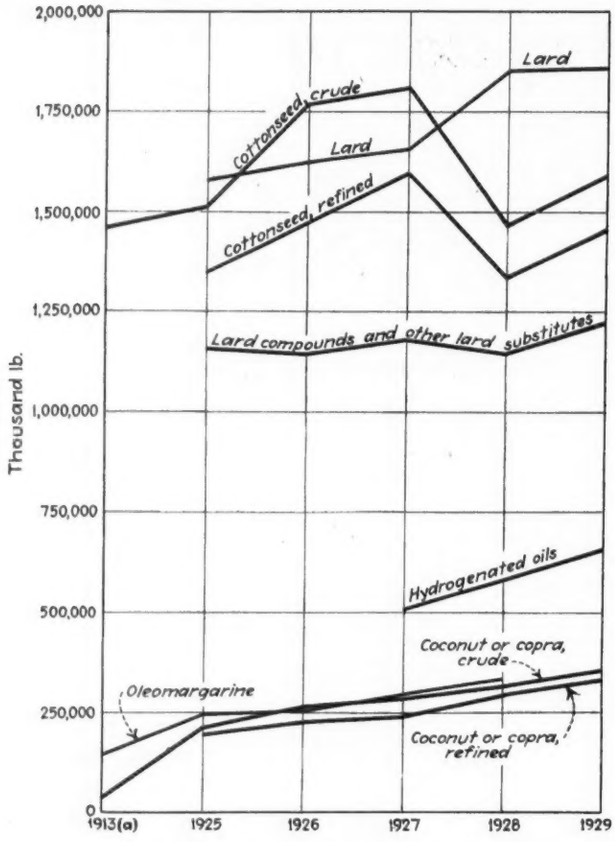


Fig. 2—Factory production of fats and oils

and-out shortening compounds are also used for this purpose.

It is a little difficult to explain the increased use of fats and oils in the diet. Definite statistical information as to just how the products were used 30 years ago is not available. Household cooking undoubtedly has declined during this period, especially in baked goods, for a much larger proportion of them are now being produced in commercial plants. It is believed that in household cooking there was much more butter used than in commercial baking. With the decline in bread consumption which has taken place in the past 30 years, and the possible decline in the household use of butter in cooking, it is remarkable that butter consumption per capita has remained at about 17 lb., as compared with 19.9 lb. 30 years ago. During this period, of course, there has been considerable fluctuation in consumption, and a definite tendency to rise from the low war-time levels of butter uses is noted in the figures for the past ten years.

The maintenance of butter consumption at levels approximating those of 30 years ago may be due to the generally higher standards of living of the rank and file of the population, and to the more liberal use of butter by large groups, particularly in the Southern states, where very little butter was used at the earlier period.

The use of shortening compounds for household cooking has been aided by the attractive appearance of the product and extensive advertising. In commercial baking, when it must compete in merit with lard, the relative price of the two products is the determining factor.

It is possible that the rise of 10 lb. per capita in consumption of vegetable shortening compounds and margarin for cooking purposes, with no accompanying decrease in lard consumption, is due, in part, to the growing custom of trimming meats in the packing plant or butcher shop, so that much of the fat which at one time was taken home and used for domestic cooking is now diverted to industrial uses. It is also probable that increased use can be traced to the improved standard of living in the lower ranks of population, which enables those composing these classes to purchase more cooking fats for use in products such as cakes, crackers, and sweet baked goods for which shortening is an important ingredient. At any rate, as a result of this increase in the use of vegetable oils, a large industry has been built up for their manufacture and distribution. A large import and export trade also now exists in the oil seeds, the raw materials, and in the refined products.

Whether it is possible to substitute vegetable oils for animal fats in a satisfactory way is of considerable interest to those who must look a long way into the future, when they believe animal production of necessity must be reduced, and substitutes used for the animal meats and fats. There would appear to be no limit to the possible production of vegetable oils. They are produced at extremely low cost and in great abundance in the tropics, especially in such form as coconut, palm, and peanut oil. We apparently may look for a continued expansion in the future use of vegetable oils.

Table III—Estimated Total Disappearance of Vegetable Oils in the United States[a]*

Vegetable oil	1925 1,000 lb.	1926 1,000 lb.	1927 1,000 lb.	1928 1,000 lb.	1929 Preliminary 1,000 lb.
Cottonseed					
Total disappearance	1,501,758	1,506,944	1,553,467	1,507,007	1,585,574
Net factory consumption	1,277,101	1,319,998	1,329,917	1,284,135	1,353,347
Other consumption	224,657	186,946	223,550	222,872	232,227
Peanut					
Total disappearance	17,895	18,900	11,792	17,068	17,385
Net factory consumption	10,823	10,637	9,010	11,724	11,658
Other consumption	7,072	8,263	2,782	5,344	5,727
Soybean					
Total disappearance	20,124	25,980	12,805	10,056	12,875
Net factory consumption	17,181	20,145	9,088	11,794	17,747
Other consumption	2,943	5,835	3,717	*b*—1,738	*b*—4,872
Olive, edible					
Total disappearance	87,723	83,157	74,597	85,127	95,446
Net factory consumption	1,814	1,057	1,387	643	1,064
Other consumption	85,909	82,100	73,210	84,484	94,382
Coconut					
Total disappearance	427,998	444,634	534,034	568,469	657,171
Net factory consumption	394,666	407,014	519,300	554,080	645,910
Other consumption	33,332	37,620	14,734	14,389	11,261
Corn					
Total disappearance	98,641	115,410	111,611	120,586	137,165
Net factory consumption	27,759	43,392	36,920	37,598	49,597
Other consumption	70,882	72,018	74,691	82,988	87,568

*Compiled by "Foreign Crops and Markets," U. S. Department of Agriculture.

(*a*) In terms of crude oil, except olive, which is expressed as edible. Stocks, exports, and imports of refined oil, except olive, converted to a crude basis, using the factor 0.93 for cottonseed and corn oils, and 0.94 for peanut, soybean, and coconut oils. In calculating net factory consumption, the factory production and consumption of refined oil was also converted to a crude basis.

(*b*) Net factory consumption for the year is greater than estimated total consumption.

Abstracts of Current Literature

INVERT SUGAR IN HONEY. C. I. Kruisheer. *Recueil des Travaux Chimiques des Pays-Bas,* Vol. 49, pp. 841-9; July, 1930.

The Fiehe test has long been considered the best, if not the only dependable, means of detecting adulteration of natural honey with invert sugar. A new test has now been developed, as a means of detecting adulteration of natural honey and also for examination of artificial honey (invert sugar) preparations. The new method depends on the fact that fructose in concentrated solutions can be polymerized to levulosin by heating with a small quantity of acid. The levulosin can be hydrolyzed back to fructose; but this change is much slower than the inversion of sucrose or the hydrolysis of inulin, either of which can be completed in ten minutes. Taking advantage of this, the honey or artificial honey is fermented to remove fructose, glucose, and sucrose. The remaining solution contains the levulosin, glucosin, dextrin, and the like. It is subjected to inversion conditions, one portion for ten minutes and another for three hours. Fructose is determined in each of these portions; from the results the levulosin content of the sample can be estimated. In developing this method, it was also observed that roasted chicory contains levulosin. Applicability of the test to heated honey has not yet been ascertained; but it is anticipated that it will be helpful in the examination of honey cake and like products.

* * *

OIL EXTRACTION. Bruno Hassel. *Seifensieder-Zeitung,* Vol. 57, pp. 577-9; Aug. 14, 1930.

Imperfections in extraction equipment and methods during the early development of extraction aroused much opposition to the process. Improvements have brought the practice to a stage in which certain superiorities are clearly established as compared with production of pressed oils; but probably more harm has been done to extraction development by extravagant and exaggerated claims and promises than by the most active opponents of the process. To meet the need for actual production data, free from opinions and propaganda, tables are presented showing yields of oil and meal, oil content of extracted meal, and analyses of oil and meal, for a number of vegetable oils. These include cottonseed, linseed, mustard seed, maize, soy beans, wheat germs, cacao press cake, and a sample of Filtrol containing cottonseed oil. For comparison, figures are given also for menhaden oil and for extraction of cylinder oil from a sample of spent fullers earth. Figures for extraction of oil from some animal sources had been published previously. For the vegetable oils above listed, the total yields (sum of oil and meal recovered from the original charge) range from 96.5 to 100 per cent of the weight of the charge. The figures are taken from large-scale extractions (charges of about 0.5 to 5 tons).

* * *

THE PREPARATION AND ANTIRACHITIC ACTIVATION OF SOME DERIVATIVES OF ERGOSTEROL AND CHOLESTEROL. D. W. MacCorquodale, Harry Steenbock, and Homer Adkins. *Journal of the American Chemical Society,* Vol. 52, p. 2512-2518; June, 1930.

Using ergosterol or cholesterol as raw material, five new sterol compounds were formed and properties determined. These sterol derivatives were irradiated, compounded into the diet of rachitic rats, and studied for curative effects. Isoergosterol, isoergosteryl acetate, chloresterol-d-glucoside, and cholesteryl hippurate showed no activation. Ergosterol hippurate, tetraacetylglucoside and glucoside showed some activation. Alpha-ergostenol and alpha-ergostenyl acetates' results were not conclusive.

* * *

FOOD VALUES AND DIET. Jan. Straub. *Chemisch Weekblad,* Vol. 27, pp. 362-5; Jan. Straub and Jeanne Hartgrink, Vol. 27, pp. 366-9; June 14, 1930.

On the basis of relative food values (calories) and prevailing prices, a plan is developed for analyzing the true economic values of foodstuffs. It is considered that the cost of a given food is expended, in the main, for three values: calories, protein content, and a residual value which may depend on accessory food factors or on flavor or other appetizing properties. The Thomas biological valuation of proteins is discarded in favor of a statistical valuation by which 1 gram of animal protein is rated as equivalent to 2 grams of vegetable protein. This is said to give the same final result as the Thomas valuation. In the second of the two articles (Straub and Hartgrink), this plan of food valuation is applied to a number of common foods in accordance with conditions prevailing in Holland. These conditions are such that 1 Dutch cent is considered equivalent to 100 calories, or 2 grams of animal protein, or 4 grams of vegetable protein. Comparative valuations are stated for meats (including horse flesh), milk and cheese, butter and margarin, green vegetables, root vegetables, beans and peas, fruits, potatoes, sugar and confections, several varieties of bread, and for fish. Finally, the analysis is applied to the estimated food requirements for a balanced diet for two persons for one month.

* * *

FRUIT JELLIES. W. Ziegelmayer. *Kolloid-Zeitschrift,* Vol. 52, pp. 243-8; August, 1930.

A comparison has been made, by viscometric measurements, of the jelling tendency of juices of currants, gooseberries (green and ripe), tomatoes, apples, and rhubarb. Trials also were made with a proprietary pectin preparation for making jellies from pears, plums, cherries, and rhubarb. In studies of the influence of various factors, it was observed that the optimum sugar concentration, in a juice having optimum acidity, is about 60 per cent, and that the best effect on viscosity is obtained if half the sugar is held out and not added till the juice has been boiled. In view of the importance of acid concentration, trials were made of the effect of citric, tartaric, and other organic acids on jelling tendency. At low concentrations, added acid inhibits swelling of the gel, but at medium concentrations the swelling tendency is increased. Boiling at constant volume (adding water to replace evaporation loss) greatly diminishes the jelling tendency. Storage for some weeks also has a deleterious effect, even in a sterilized juice. This is also true of the proprietary pectin preparations after opening the container; hence such preparations should be used promptly. Juices rich in pectin do not mold as readily as those with very little pectin. The experimental results are illustrated with curve charts and tables of data.

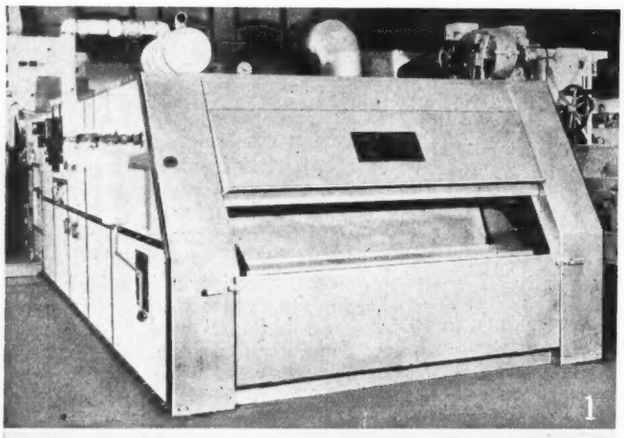
* * *

DO BAKING POWDER RESIDUES EXERT INJURIOUS EFFECTS UPON THE GROWTH AND NUTRITION? Wm. C. Rose and Florence L. Catherwood. *J. Nutrition,* Vol. 2, p. 155-70: 1929; *C. A.,* Vol. 24, p. 1889; April 20, 1930.

Growth experiments extending through two generation of rats showed that in the proportions ordinarily employed in the preparation of bread, and with twice these amounts, three typical baking powders in which the leavening agents are calcium acid phosphate and anhydrous sodium aluminum sulphate, respectively, exert no detectable toxic or injurious action. The animals receiving the powders grew as rapidly and reproduced as satisfactorily as control rats upon a similar diet without baking powder. Analyses of the blood and histological examinations of the kidneys likewise failed to reveal evidence of injury. Thirteen references are appended.

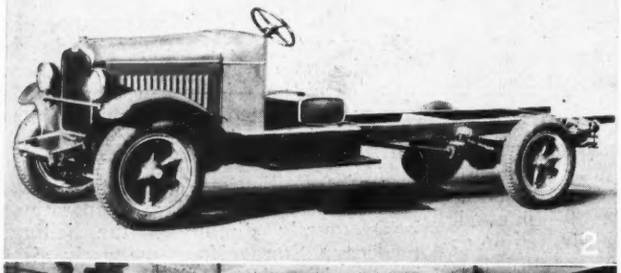
New Equipment Seen at the Bakery Exposition

ADMITTEDLY the outstanding exposition in the history of the baking industry, the 1930 International Bakery Exposition, held in Atlantic City, N. J. from Sept. 22 to 26 inclusive, presented many equipment developments of interest to readers of *Food Industries*. To note all these mechanical aids to the production of bakery products would involve a review of the history of the mechanization of the industry. This summary covers units that came to our notice as being of most recent development.



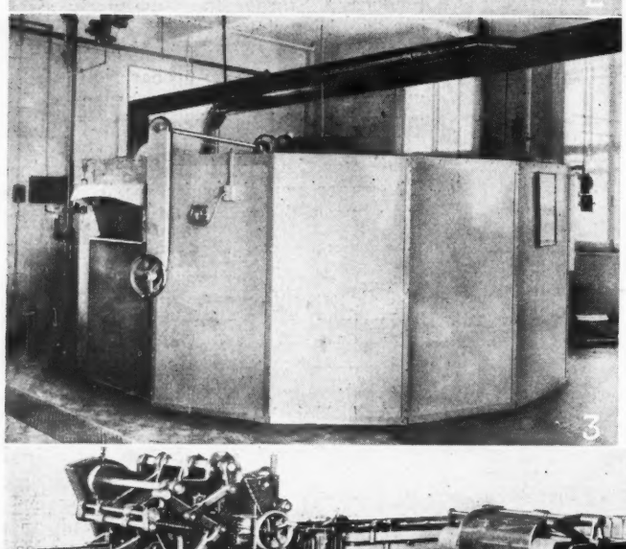
1. Tray Oven Heat Automatically Controlled

Included in these exhibits was the new tray oven developed by Baker Perkins Company, Inc., Saginaw, Mich. This oven varies in size from 1,250 to 3,000 lb. capacity and has automatically controlled radiant-heat equipment. Such provision gives this oven the advantage in construction and operation of the large B.P. traveling ovens. The quantity of heat in any section can be controlled to adapt oven temperature to type of products baked and to give desired results.



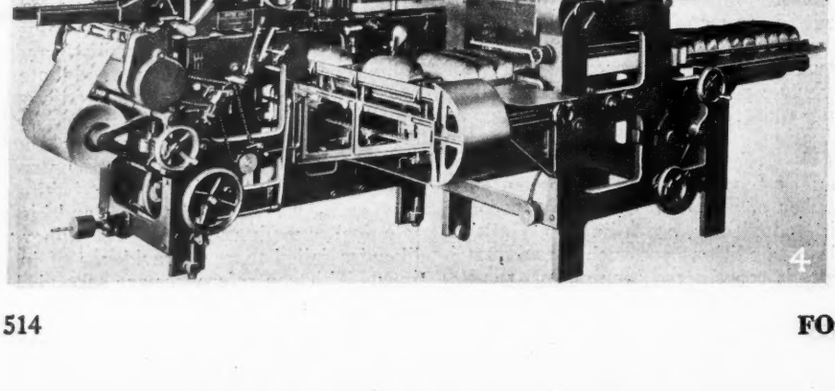
2. New Four-Cylinder Delivery Truck

Fitted with an attractive body for bakers, the new addition to the group of White trucks was exhibited by the White Company, Cleveland, Ohio. Model 160, (chassis shown in illustration) lends itself to light delivery truck service. Its 4-cylinder monobloc engine has a 4-in. bore and a 5½-in. stroke. Standard wheelbase is 138 in., but may be 157 in. Selective type of transmission gives four speeds forward and one reverse. Standard gear has ratio of 4.73 to 1; ratios of 4.23 to 1, 5.22 to 1, and 5.88 to 1 optional. The construction of this truck provides for positive supply of clean oil under pressure, positive water circulation for cooling of engine, single plate clutch operating in oil, and vacuum system feed with 20-gal. gasoline tank mounted under driver's seat. It is equipped with a compound jet carburetor of double venturi type, 4-wheel Lockheed hydraulic service brakes of internal expanding type, and an external contracting type emergency brake. Other specifications indicate sturdy construction.



3. Rotary Oven Heated Indirectly

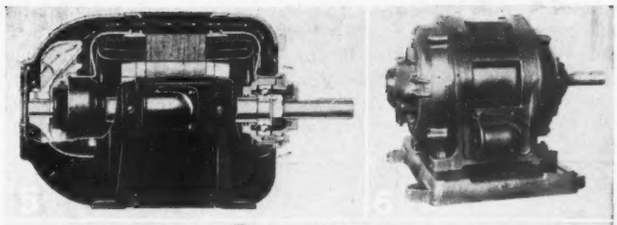
The rotary oven of the steam-pipe type exhibited by Baker Perkins Company, Inc., Saginaw, Mich., utilizes radiant instead of convected heat and meets the needs of a small or medium size bakeshop. It provides for separate regulation of top and bottom heat necessary to the baking of cakes, pies, and other pastries. The furnace is entirely inclosed in the oven in such a manner that no combustion products can enter the oven. Coke, coal, oil, or gas may be used as fuel. Mechanical shifting of the oven hearth is provided for by a foot-operated electrical switch.



4. Bread Sliced and Wrapped Automatically

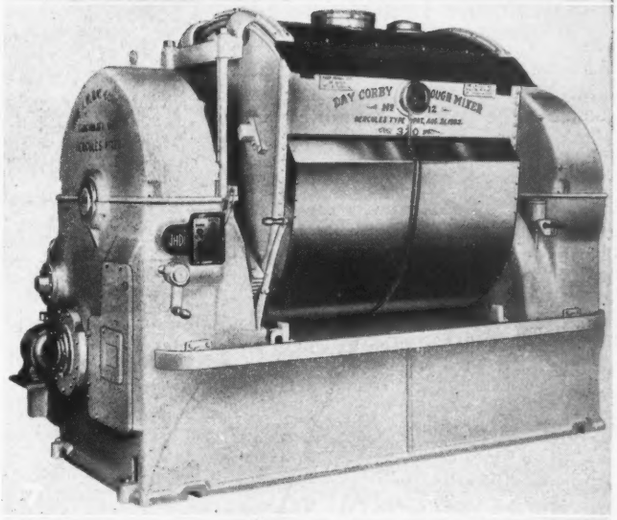
The compact unit exhibited by the Battle Creek Wrapping Machine Company, Battle Creek, Mich., suggested coordinated action with other bakeshop operations. The slicing and the wrapping machines are equipped with Reeves variable-speed transmission units and with an automatic transfer of loaves from the slicer to the wrapper. This gives them a unit operation production up to 3,000 loaves per hour. The slicing machine is equipped with an automatic feed. This permits utilization of variable-speed transmission and re-

mote control to give continuous and almost automatic coordinated operations in the shop from the mixing of the raw materials to the wrapping of the finished loaf.



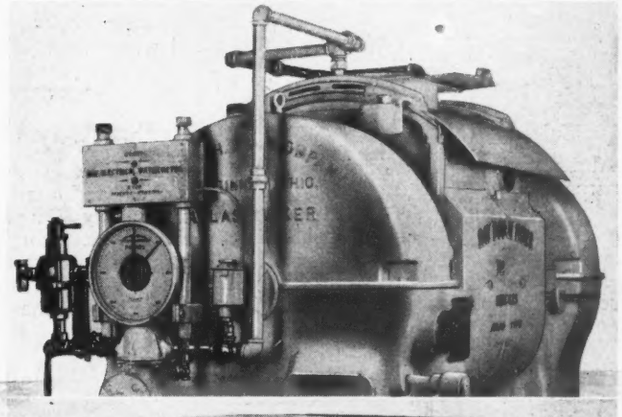
5 and 6. New Specially Designed Motors

The cutaway view illustrates the new G.E. dust-tight, totally inclosed fan-cooled induction motor shown at the bakery exposition by the General Electric Company, Schenectady, N. Y. It is said to have the same mounting dimensions for the same rating as the standard G.E. open-type, horizontal, general-purpose motor from ¾ to 50 hp. in popular speeds. This motor has been indorsed by the Underwriters' Laboratories for hazardous dust conditions specified as Class 2 in the National Electric Code. The other motor developed and exhibited by General Electric Company, has application where high starting torques and two speeds are wanted. It departs from the Standard G.E. single-winding, squirrel-cage induction motors in that it takes care of high starting torques, high throw-over torques from low to high speed, and the increasing horsepower output over short intervals of time. The high torques are said to be obtained without exceeding the starting current values of single-speed motors for full voltage starting.



7. Mixer With Stainless Steel Working Parts

Further utilization of corrosion resisting metal in food processing was exemplified in the Hercules Mixer exhibited by the J. H. Day Company, Cincinnati, Ohio. This mixer is of the Corby roller type and is equipped with stainless steel canopy cover, jacket for the mixing tank, and agitator shaft. When specially ordered the entire agitator and shaft are made of stainless steel. As shown at the bakery exposition this machine was operated with robot control.

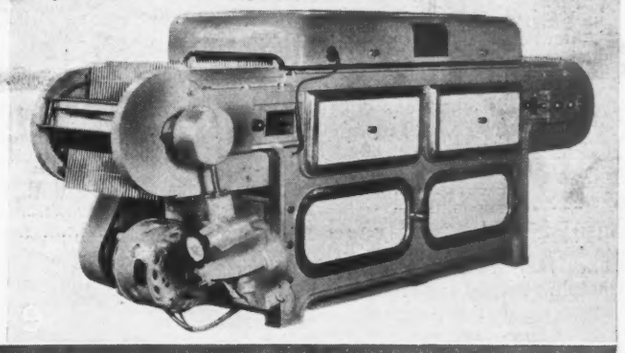


8. Electrical Water Meter and Blender

The J. H. Day Company exhibited a recent development known as the Day electrical water meter with a thermostatic water blender for use with mixers of the Corby type. This meter is said to be accurate within less than 1 per cent and to give properly blended water within the range of the hot and cold water available. The automatic thermostatic controller is graduated at 5-deg. intervals from 40 to 90 deg. F.

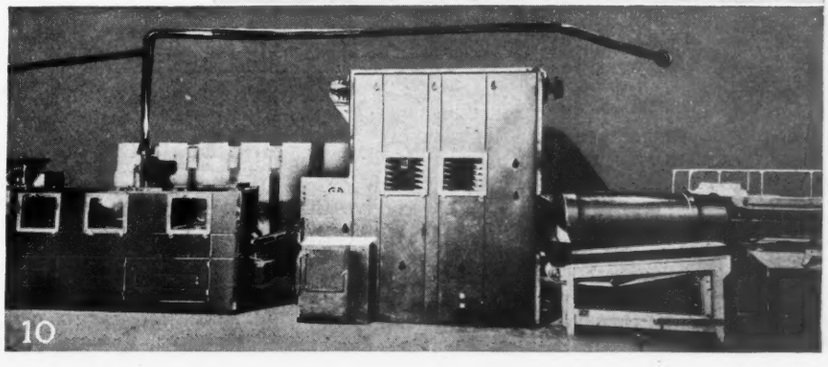
9. Novel Slicing Machine

The Rohwedder synchronizing bread slicer exhibited by the Mac-Roh Sales & Manufacturing Company, Davenport, Iowa, represents a departure from the more familiar method of dividing the bread loaf into slices. As the loaf passes through the machine it is cut from above and from below to leave a narrow strip across the middle of the loaf. This isthmus holds the loaf intact for subsequent handling without use of tray or carton and retards drying out of slices after wrapper is removed. Individual slices are obtained as wanted by the use of a knife or slight tearing force. The machine is capable of being synchronized with a wrapping machine at any speed to give a production of between 400 and 3,600 loaves per hour.



10. All-Automatic Doughnut Department

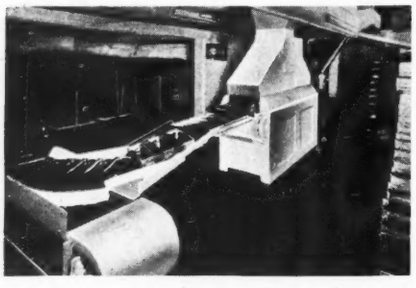
A convincing illustration of what is possible in the unification of a department was demonstrated by the Doughnut Machine Corporation, 1170 Broadway, New York City. The recent development of its automatic cooling conveyor and modern packaging table makes possible a complete hook-up of automatic doughnut producing machinery. The unit as operated at the exposition is



complete from the automatic dough feed to the packing table where the automatically sugared doughnuts are packed into display sanitary packages. This unit is said to produce in package form individually cooled doughnuts at the rate of 160 doz. per hour.

Automatic Pan Greaser

Elimination of the unsightly and distasteful features of an operation usually considered necessary to bread production prompted the development of the machine shown in the illustration. The Larson pan greasing machine manufactured by the Larson Machine Company, Oakland, Calif., is said to fit into a co-ordinated production line and to operate satisfactorily with a 100 per cent saving in labor. Another claim for this invention is that it saves 50 per cent in greasing material and 75 per cent in floor space used.



Automatic regulation of the oil spray controls its flow and its application so that the entire inside surface of the pan gets a definite quantity of oil. The vapor arising from the spray is said to be condensed and returned to the oil reservoir. Construction of the machine permits it to grease any bread pan up to 18 in. in length and 6 in. in height as individuals or in sets. No adjustment is necessary and it is asserted that no oil is applied to the exterior of the pan.

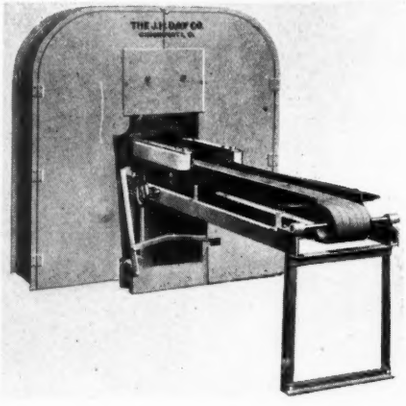
Total of 1 hp. is required for operation of machine. Oil and power cost is estimated at less than 15c. per thousand pans. Fixed charges covering depreciation, interest, and maintenance are stated as 65c. daily.

Band Saw Type Bread Slicer

The Day bread slicer embodies a principle widely used in the woodworking and meat-packing industries. This machine consists of two sets of heavy step-cone band wheels fitted with ¼-in. saw blades. The teeth of these saws have no set and each blade is brazed together to fit exactly its particular step on the cone band wheel. The tension on each set of bands is simultaneously adjusted by means of a hand wheel. The bands are said to be quickly replaceable.

Two 3-hp. motors drive the two sets of band wheels by direct connection and a ½-hp. motor drives the canvas feed belt and the two auxiliary chain conveyors on the sides that hold the loaves in position while approaching the saws.

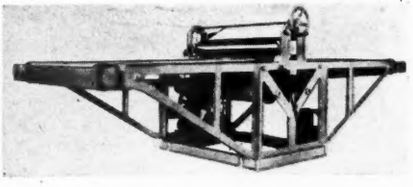
This machine is made in two sizes by the J. H. Day Company, Cincinnati, Ohio: No. 1, adjustable from 8 to 12 in.; No. 2, adjustable from 12 to 18 in. It is designed to give slices uniformly ½ in. thick, having the same cross-section shape as the original loaf, and free from crumb. The entire unit is wired to give remote push button control from the



discharge chute. The sliced loaf is discharged in such a manner that this slicing machine may be made a unit in an automatic hook-up of cooling, slicing, and wrapping equipment.

Two-Way Dough Roller

The Dragon dough roller, manufactured and marketed by the American Bakery Equipment Company, 1051 Howard St., San Francisco, Calif., is another step in the elimination of unnecessary labor. Merely by turning an electric switch the operator can run the dough back and forth through the ad-

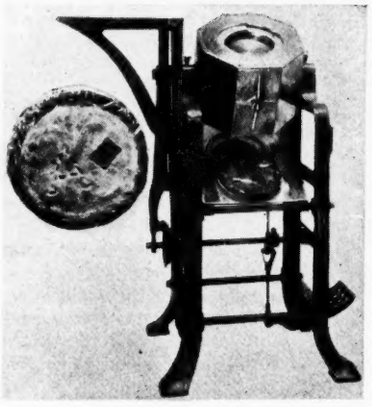


justable rolls until the desired thickness is obtained.

This machine has been designed for use with sweet doughs. It is intended to relieve the operator of picking up his dough, carrying it back to the front of the roll, and repeatedly passing it through in this manner until rolled out to meet his need.

Pies Machine-Wrapped And Sealed

In order that his customers might receive their pies in an attractive and sanitary condition, H. Dragon, San Francisco, Calif., invented a machine to wrap pies in a transparent wrapper. The wrapper is drawn over the top of the pie with the edges brought together on the bottom. Another operation of



the same machine glues a pie plate to the wrapper.

As many as 800 pies an hour are said to be wrapped by this machine at a cost of 8c. for plate, transparent paper, and glue. Pies of different sizes can be wrapped on the same machine, but, due to the careful adjustment necessary, it is deemed advisable to have a different machine for each size.

This machine was a part of the exhibit of the American Bakery Equipment Company, 1051 Howard St., San Francisco, Calif. The inset indicates the appearance of a pie wrapped in cellophane. These wrapped pies are said to retain their freshness longer than the unwrapped ones and to offer greater resistance to breaking or crumbling than those put in bags or loosely wrapped in paper.

High-Capacity Bread Slicer

Forty-four hundred loaves sliced per hour is the reputed capacity for the Rohwedder Slice-Master, exhibited by the Mac-Roh Sales & Manufacturing Company, Davenport, Iowa.

It is said to be suitable for direct feed into well-known non-carton wrapping machines and to be silent and

vibrationless in operation. The high pitch of the feed chute is calculated to give automatic forced speed of loaves through the knives.

Critical Book Reviews

AN INDEX TO THE CHEMICAL ACTION OF MICRO-ORGANISMS ON THE NON-NITROGENOUS ORGANIC COMPOUNDS. By Ellis T. Fulmer, Professor of Biophysical Chemistry, Iowa State College, and C. H. Werkman, Associate Professor of Bacteriology, Iowa State College. Charles C. Thomas, Springfield, Ill., 1930. 198 pp. Price, $4.50.

IN THE course of researches into the production of chemicals from agricultural wastes the authors have compiled much, although admittedly not all, of the valuable data on this subject that heretofore had been scattered throughout the scientific literature of the world. It has been collected and tabulated in a form that will be very useful to the research worker. The first table is an index to micro-organisms together with the substances which they convert into other known substances. In a parallel column is given the end product and the author reference.

The second table contains the same data arranged according to another plan in which the substrate is the key. Under each substrate are given the various end products and in a parallel column are listed the micro-organisms and the author references.

A third table gives the same data classified according to the substances produced. The fourth section is an author index which includes a number of patents that are cited without naming the patentees.

* * *

HANDBOOK OF CHEMICAL MICROSCOPY. Vol. I. By E. M. Chamot and C. W. Mason. Cornell University. Published by John Wiley & Sons, Inc., New York, 1930. Cloth, 9¼x6¼. 475 pp., 162 illustrations. Price, $4.50.

THIS volume considers the principles and uses of microscopes and accessories as well as certain physical methods for the study of chemical problems. Though obviously based upon Chamot's Elementary Chemical Microscopy, published in 1914, it far surpasses the latter in variety of subjects presented and thoroughness of treatment.

It may be truly said that this work is the only one in the English language which deals with the technique of chemical microscopy. The methods, many of them original, and all thoroughly tested in the splendidly equipped microscopical laboratories at Cornell, are reliable, concisely stated and, best of all, applications and limitations are fully discussed. The subject of chemical microscopy is all too little known in our food laboratories. A great many of the common laboratory tests on foods can be best carried out microscopically. Even quantitative analyses may be made in many cases with a fair degree of accuracy. Examples are: the examination of flours, stock feeds, fertilizers, teas, spices, paper, and fibers for composition, purity, or grade. The crystal systems, which form the basis for identification of most solid chemical substances, are especially well handled.

Necessarily much of the book is taken up with descriptions and uses of various microscopes and accessories. There are chapters on ultra-microscopy—a subject which is rapidly gaining in interest because of its application to colloids, photomicrography, crystallography, refraction, and metallographic methods. The appendix contains a good bibliography, and a summary of suggested practice experiments. A copy of this book should be found on the bookshelf of every laboratory connected with food industries.

C. R. FELLERS.

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AMERICAN INDUSTRY AND COMMERCE. By E. Dana Durand, Statistical Assistant to the Secretary of Commerce and former Director U. S. Bureau of the Census. Ginn & Company, New York. 637 pages, leather. Price, $4.

TO PRESENT dry statistics in such a way as to hold the interest of the average reader requires an ability few writers ever attain. In his treatise "American Industry and Commerce," Dr. E. Dana Durand, statistical assistant to the Secretary of Commerce and former director of the U. S. Bureau of the Census, has attained an enviable position as an interpreter of data. Few who take up this book will lay it down until several chapters have been covered.

The author, drawing upon his long statistical and economic experience in American industry and commerce through his contact as a government official, presents a vivid picture of the development of American industry and commerce since the founding of the nation and especially during the present century. Special stress has been laid upon international comparisons, upon the interrelation of the various economic activities, and upon the general course of recent economic development. The earlier history of industry and commerce is traced only in broad outline, since various other works have covered that field. The trends since the beginning of the present century are discussed with greater fullness; they are the more significant because the forecast elements are largely of a continuing character, so that economic movements for some time to come are likely to be in the same direction.

The author has relied almost entirely upon authoritative statistical publications for his basic facts. He discusses the basic causes of American prosperity and progress, and finally undertakes to discuss the relation of the general economic status and trends of the country to the well-being of the masses of the population. ROBERT M. DAVIS.

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Government Publications

DOCUMENTS ARE AVAILABLE *at prices indicated from Superintendent of Documents, Government Printing Office, Washington, D. C. Send cash or money order; stamps and personal checks not accepted. When no price is indicated pamphlet is free and should be ordered from bureau responsible for its issue.*

Markets for Fruit Juices and Fruit Sirups in Pacific Countries, by S. R. Peabody. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 704; 10 cents.

Australian Canned Fruit Industry, by E. C. Squire. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 703; 10 cents.

Fruit Markets in Eastern Asia, by B. H. Cocheron and W. J. Norton. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 693; 10 cents. A joint investigation by the U. S. Department of Commerce and the University of California.

Latin American Markets for Dairy Equipment and Supplies. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 710; 10 cents.

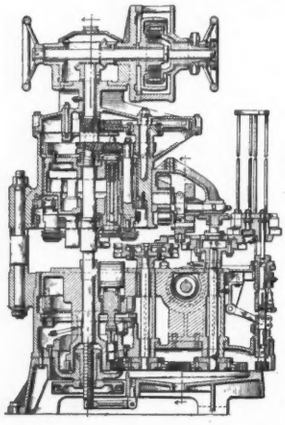
Canned Grapefruit Production and Trade, by Clarence E. Birgfeld. Bureau of Foreign and Domestic Commerce Trade Information Bulletin 706; 10 cents. A statistical document with special emphasis on foreign markets.

Milk and Cream Contests. U. S. Department of Agriculture Department Circular 384. A discussion of the use of such contests for stimulating better milk supply, and a description of how to conduct them.

Industrial Specifications. Bureau of Standards Circular 378, 5 cents. Alphabetical index and numerical list of federal specifications promulgated by the Federal Specifications Board (complete to Nov. 1, 1929) which are appropriate also for commercial use.

Selected Patents

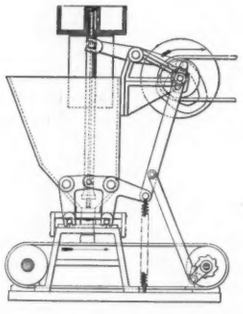
Ends Double-Seamed to Can Bodies—John Coyle, Baltimore, Md., to Continental Can Company, Inc., New York, N. Y. No. 1,763,458. June 10, 1930—This invention incorporates in one machine the means for feeding filled cans



into the machine, placing end on can as it moves to sealing mechanism, rounding up can body while end is being seated, holding end in position to move with can to sealers, and double-seaming the end to can body. The cans enter machine in a straight line then have a change in direction to conform to the circular action of the sealing mechanisms.

* * *

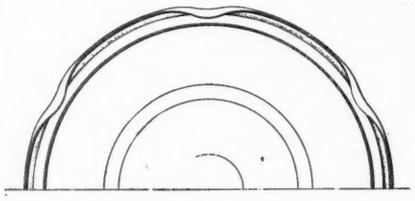
Mechanical Formation of Jelly-filled Confections — William B. Laskey to Mason, Au & Magenheimer Confectionery Manufacturing Company, Brooklyn, N. Y. No. 1,765,874. June



24, 1930—This invention provides for a machine to form a shell of edible plastic mass and almost simultaneously to force a jelly-like mass into the center of the plastic mass. At the end of each regulated cycle of operation there is formed at least one piece of confection containing a jelly center.

* * *

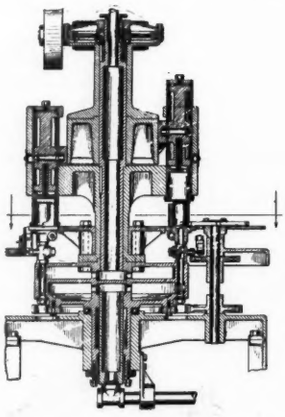
Method of Vacuum Packing Coffee—Leslie W. Hills to Hills Bros., San Francisco, Calif. No. 1,766,173. June 24, 1930—By this method the lid is crimped along edge at regular spaced intervals to engage flange on can body during application of vacuum. This in-



vention is proposed to permit the rapid rarification of the air in the cans without displacement of lid or loss of contents of cans while the air pressure on the outside of the can is suddenly reduced to approximately 13 lb. per square inch less than the pressure inside the can. While under this reduced pressure condition the partially clamped lid is forced upward sufficiently to allow equalization of pressure inside the can with that on the exterior. In this rarified atmosphere the can is fully sealed with the customary adhesive-lined, double-seam type of closure.

* * *

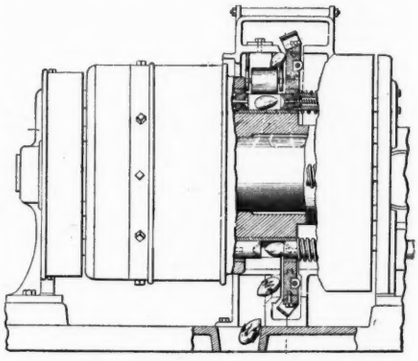
Filling Cans With Inactive Gas—Clifford S. Seltzer, Newark, N. J., to American Can Company, New York City. No. 1,770,435. July 15, 1930—A machine that replaces air in a filled can



with inactive gas and seals the can. This machine acts as a unit to feed filled cans into stations where cans are temporarily sealed for a predetermined length of time, to open can for removal of air, and by automatic operation of valves to close out air, to force in gas, and to seal cans completely. In case a can is missing from a station the valves do not operate at that station. In this manner the waste of gas is avoided.

* * *

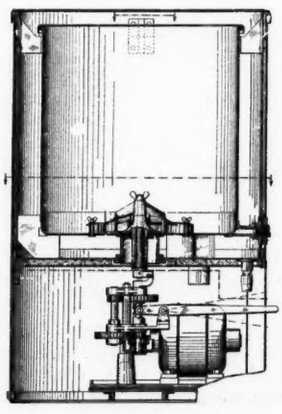
High Speed Nut Cracker With Continuous Feed—William Gebhardt to G. A. Dueler Manufacturing Company, San Antonio, Texas. Nos. 1,761,822 and 1,761,823. June 3, 1930—This rotary-drum type of machine is fitted with receiving pockets for the nuts and with several pairs of hammer and anvil plungers, which are synchronized in their operations to each other and to the position of the nut pockets. Co-acting cam and spring mechanisms insure a grip of uniform pressure on the nuts and give the breaking force necessary to produce the highest percentage of whole meats. The design of the feed and cracking mechanisms permit adjustments to suit the size, shape, and other characteristics of the nuts. A rotating pick-up mechanism operates in its own zone, yet in such relation to the rotating drum that when a nut pocket in the drum comes into proper position a nut is ready to be dropped into the pocket. This is accomplished by spoon-like projections on the periphery of a wheel that operates through a receiving hopper for the nuts and between flanges that hold the nut in the spoon-like receptacle until the nut reaches a point adjacent to the nut pocket in the rotary drum. Due to the shape of the spoon-like receptacle and its highly polished



inner surface, the nut, by force of gravity, slides into the small hopper that leads to the drum. The small hopper accommodates only one nut at a time and causes the nut to fall on the surface of the drum that serves as a bridge between the nut pockets. The rotating drum surface adjusts the position of the nut in the small hopper to make it drop properly into the pocket in position to be cracked. Voids in the feed are prevented by rotating disks with knob-like projections that keep the nuts stirred up. A uniform supply of nuts is maintained in this field hopper by a screw conveyor or some such arrangement.

* * *

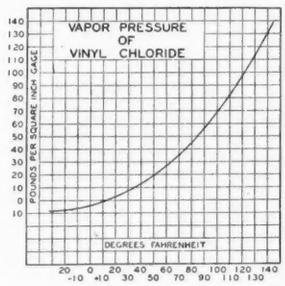
Beverage Mixer and Cooler—James Peters, Roslyn Heights, N. Y., to Turbo-Mixer Corporation, New York City. No. 1,769,890. July 1, 1930—A unit mixing and cooling apparatus for preparation of beverages or other liquid materials that require simultaneous mixing and temperature regulation. Consists of temperature regulating tank on fixed support and a mixing compartment sup-



ported by and centered in cooling tank. Mixing tank is fitted with agitator which is driven from underneath in such manner that mixing tank can be conveniently removed from unit for cleaning purposes.

* * *

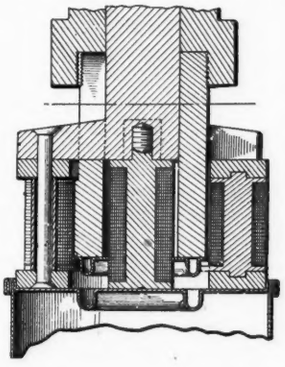
Vinyl Chloride as Refrigerant — Joseph G. Davidson, Yonkers, N. Y., to Carbide and Carbon Company, New York, N. Y. No. 1,765,211. June 17, 1930—This invention consists of a refrigerating process in which vinyl chloride per se or as at least a 20 per



cent component of a mixture is the refrigerant. The other component of the mixture is a chemical compound which boils lower than —14.2 ± 0.5 deg. C. and has a type formula $C_nH_{2n+1}R$; R being either hydrogen or halogen. Example: methyl chloride, CH_3Cl.

* * *

Closing Vacuumized Cans—James H. O'Neill, Syracuse, N. Y., to Continental Can Company, Inc., New York, N. Y. No. 1,761,488. June 3, 1930—Can is previously filled and closed on end with double seam lap. This end contains a concentric annular recess, which is



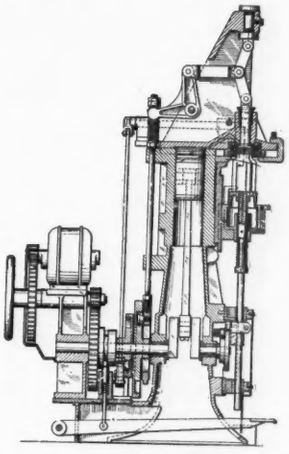
perforated at bottom. A friction closure or plug, which is shaped to completely and frictionally fit this recess, is lightly put in place. As the can passes into vacuum chamber and under the closing head, this closure is magnetically lifted from can and held directly over recess while can is being vacuumized. When desired vacuum has been obtained closing head forces closure into recess to fully close perforations and keep contents of can under vacuum.

* * *

Non-hydroscopic Whey Powder — Nicholas L. Simmons, Wausau, Wis. No. 1,763,633. June 10, 1930 — Whey liquor is concentrated in single effect vacuum pan at 22½ in. of mercury and 145 deg. F or in a double effect pan at 12 in. of mercury and 162 to 165 deg. F. in first effect, and 22½ in. mercury and 145 deg. F. in second effect. This gives a product having 60 to 65 per cent solids. The concentrate is run into setting pans to allow lactose and mineral constituents to crystallize out into stable forms containing normal water of hydration or crystallization. Remaining free moisture is removed by any means that does not affect water of crystallization or hydration, preferred temperature 140 deg. F., and that gives a white, flaky, readily soluble product which is not hydroscopic.

* * *

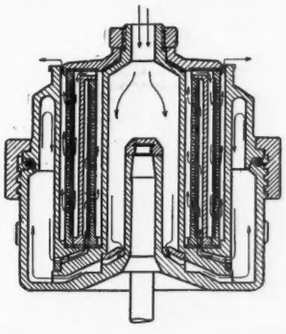
Bottles Vacuum Sealed — Abraham Podel to Anchor Cap & Closure Corporation, Long Island City, N. Y. No. 1,767,475, June 25, 1930—This vacuum sealing machine receives the bottle from



below, contains die units that close about the neck of the bottle in an airtight manner to form the bottom of the vacuum chamber, and has means for exhausting air from this chamber and for sealing the bottle while under vacuum.

* * *

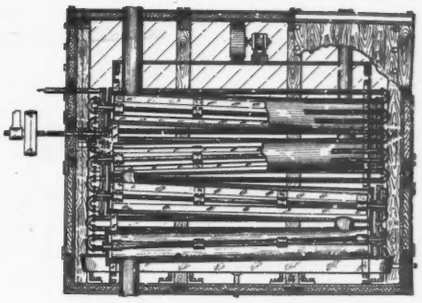
Closed Centrifuge for Clarifying Liquids—Carl Schmitz, Oelde, Germany. No. 1,767,314. June 24, 1930—This machine is constructed to effect full clarification of liquids by zone stages.



Provision is made for removal of heaviest particles in the zone that is subjected to greatest centrifugal force. Succeeding zones are separated by screens and filter mediums. Arrows on illustration indicate direction of flow.

* * *

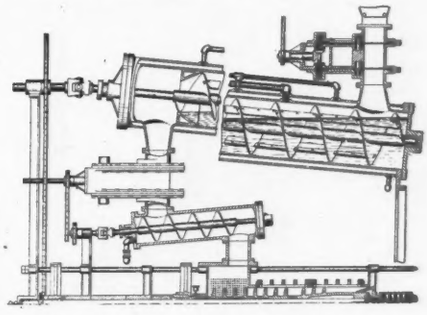
Cooling Cocoa Powder — Walter Wain, Fulton, N. Y. No. 1,765,037. June 17, 1930—Powdered material, such as cocoa, is claimed to be cooled in a progressive manner from about 110 to 50 deg. F. while passing through a series



of inclined tubes. These tubes, which are enclosed in an insulated, air-tight, box-like housing, are paralleled by a series of refrigerated coils. Agitators of the conveyor type keep the powder in motion while forcing it from the inlet at one end of each successive tube to the outlet at the other end of each tube. When the powder is discharged from the lowest tube in the series it is said to be of uniform temperature.

* * *

Recovery of Fat From Meat Stock—Edgar T. Meakin, Berkeley, Calif. Nos. 1,766,032 and 1,766,033. June 24, 1930—Method and apparatus for obtaining grease, such as lard, from grease-bearing material while under vacuum. Apparatus



as shown, consists of cooking receptacle with feed chamber, means of retaining "tried-out" grease in cooking receptacle at constant level, and equipment necessary to heating of receptacle and to maintaining a vacuum in it. Also it provides for a discharge chamber, valve arrangements by means of which the cooking receptacle may be filled and discharged without breaking the vacuum, and a means for moving material through the cooker. Filter presses to recover the fat complete the unit.

* * *

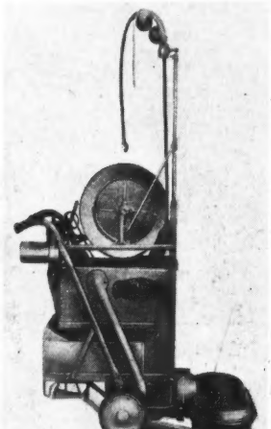
Treating Pineapple With Inert Gas Before Canning—Charles Seymour Ash to California Packing Corporation, San Francisco, Calif. No. 1,764,491. June 17, 1930—Replacement of intercellular air of the fruit with carbon dioxide, nitrogen, or similar gas and the addition of a small quantity of sulphur dioxide are claimed to result in improved flavor and color of pineapple upon aging after being canned. The prepared fruit in the cans is subjected to a vacuum-pump exhaustion of the intercellular air and subsequent treatment with an inert gas under pressure. The exhaustion and inert gas treatment is repeated with a small quantity of sulphur dioxide in the inert gas before the fruit is covered with sirup, heated in an open can, sealed, and finally sterilized by heating to 140-160 deg. F. When treated in this manner, the pineapple is said to retain its characteristic fresh pineapple flavor and color upon being aged in the can.

Manufacturers' News And Equipment

Suction Floor Scrubber

A COMBINATION scrubber and water remover developed by the Finnell Systems, Inc., Elkhart, Ind., has recently been added to industrial housecleaning equipment.

The accompanying illustration shows the design of the machine, which cleans



the floor by scouring loose the dirt with high speed twin-disk brushes and water and by removing the dirty water with suction before the suspended dirt settles on the floor surface.

It is said to clean and dry floors without leaving any dirty streaks at a cost lower than by mopping.

Rubber Lined Pumps

A 1¼-IN. centrifugal pump with specially treated hard rubber lining has been developed by Oliver United Filters, Inc., San Francisco, Calif. This "Olivite" lining is said to handle acid food materials at a temperature of boiling water without disintegration and without imparting an odor or taste to the material.

The accompanying illustration shows the pump built as a unit. This type of motor mounting permits the use of the motor bearings for the pump shaft. Belt-type drive and the two-unit type are available. It is built in two sizes, which provide capacities from 10 to 200 g.p.m., while the maximum head for the 1¼-in. pump is 60 ft. and for the 2-in. pump 100 ft. at 1,750 r.p.m. The lining material "Olivite," which is vulcanized to the iron casing and impeller, is claimed not to crack. The pump is said to give pressures up to 50 lb. per square inch.

These "Olivite" pumps have no bearings in the pump housing, are equipped with a sleeve-protected shaft and have a floating stuffing box that lessens packing troubles and shaft cutting.

The three-position design of the pump casting aids installation.

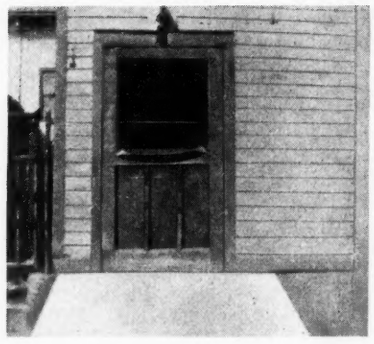
Flies Killed by Electricity

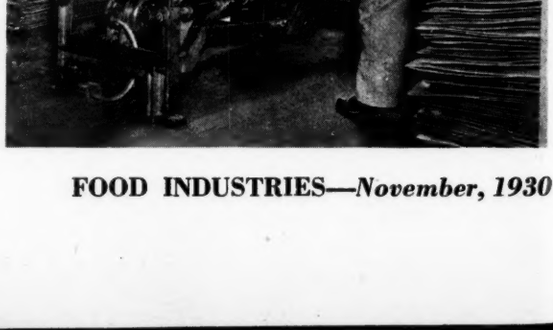
THE accompanying illustrations represent an experimental installation at the New York State Agricultural Experimental Station to keep buildings

devoted to food processing free from flies and other flying insects.

The screens are supplied with a high-tension static charge of electricity from a small transformer. It produces a charge at a potential of approximately 3,500 volts and less than 0.05 milliampere. The transformer operates on an ordinary 110-115 volt 60-cycle lighting circuit and draws less than 0.2 amp. while actually electrocuting the insects. Although deadly to insects this charge is harmless to humans.

The wires in the screen are woven alternately across an insulated framework and spaced about ¼ in. apart. When insects try to pass through the screen they are electrocuted. Screens of this type have been installed at a dairy and at a creamery in Michigan. The close-up view shows the apron on a screen filled with flies.





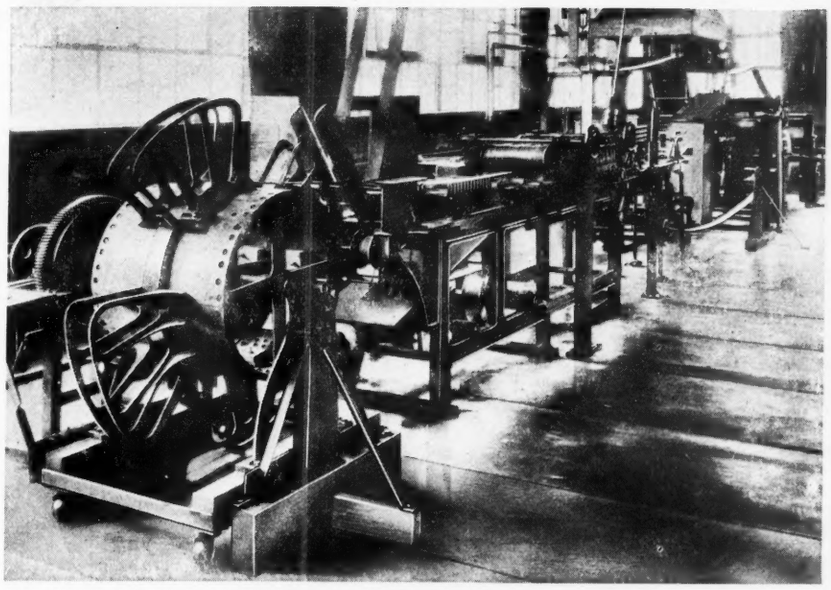
Precision Made Belting

VARIATIONS in thickness and faulty cementing of leather belts have been reduced by the development of two machines.

Fig. 1 shows the sorting machine developed by the Graton & Knight Company, Worcester, Mass., which is said to stamp the exact thickness to an accuracy of 0.008 in. in 185 places on an average sized belting bend.

Guided by these indicated thicknesses the cutter can intelligently cut the bends into belting strips required for any given weight of belting. When the leather was hand-sorted according to its "feel," errors in judgment occurred and much extra handling and further sorting was done in trying to match strips to give a belt of the desired thickness.

Another machine, Fig. 2, has been developed by the Graton & Knight Company to do cementing of the leather in a precise manner. In a continuous operation it raises the fiber of the laps of single belting and the flesh side of the leather in double belting and applies the cement so that it will penetrate and hold fast to the finished belt. The cement is said to be uniformly applied and the segments pressed together while the belt is under actual working tension.



thus assuring that the belt will be fully and securely cemented.

The company states that the cement used is strictly waterproofed, very flexible, and is heat-resistant and that belting cemented under these tension conditions has creditably withstood all kinds of operating tests in industrial plants for the past three years and has shown superior working qualities.

Manufacturers' Publications

Cutting Cost in Parcel Delivery—A 24-page booklet that deals primarily with ways and means of lowering parcel delivery cost for each individual store has been prepared by General Motors Truck Company, Pontiac, Mich. Informational charts, tables, and report cards are given.

Truck-type Switch Gear—Circular No. 1892, published by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is an 8-page booklet that describes metal-inclosed truck-type switch gear, manually and electrically operated. It is illustrated with photographs and diagrams of equipment, discusses, gives application of construction, and includes a table of interrupting capacities and dimensions.

Industrial Electric Heater—Heating units designed for portable or permanent installations are announced in an illustrated release by the American Foundry Equipment Company, Mishawaka, Ind.

Synchronizing Equipment—The Reeves Pulley Company, Columbus, Ind., in an 8-page bound booklet, shows how industrial equipment units may be synchronized in its operations.

Business Service — In an attractively bound 24-page booklet, Campbell, Peterson & Company, New York, N. Y., set forth their industrial intelligence service to manufacturers and related industries for the solution of vital problems.

Centrifugal Compressors—In a 12-page booklet consisting largely of captioned photographic illustrations of installations, the General Electric Company, Schenectady, N. Y., describes its blowers and their working parts.

Headlight Tester—In a loose-leaf folder known as Bulletin No. 100, the Roller-Smith Company, 233 Broadway, New York City, describes and illustrates its type HTD headlight tester and its type PD direct-current volt-ammeters for signal system and automatic train control testers.

General Electric Equipment—In a series of leaflet announcements and illustrated loose-leaf catalog folders, General Electric Company, Schenectady, N. Y., announces heavy-duty brakes which are spring and magnet operated, inclosed motors and external fans for cooling, mechanical drive turbine, quartz rod thermostat, general-purpose squirrel-cage induction motors, direct-current crane and hoist motors, fractional horsepower motors and motor parts, Types BA and RSC, and a new motor for hazardous conditions.

Delivering Groceries and Meats Profitably —A bound 16-page booklet prepared by the General Motors Truck Company, Pontiac, Mich., contains an impartial factual analysis concerning the use of trucks for retail food deliveries. It contains charts and tables of interest to all delivery truck users.

Automatically Controlled Gas Ovens—In an illustrated leaflet entitled "Diathermatic Heat," Baker Perkins Company, Saginaw, Mich., announces its gas-fired tray ovens.

Leather Belting and Belt Drives — By illustrated folder, Charles A. Schieren Company, 30 Ferry St., New York City, describes and illustrates uses for its Duxbak belting and its Rockwood drive.

Floor Trucks—A 16-page catalog devoted to its line of floor trucks has been recently published by the Lewis-Shepard Company, Watertown Station, Boston, Mass.

Ice Making Machinery—Frick Company, Waynesboro, Pa., in an illustrated leaflet calls attention to its equipment designed to make better ice with less horsepower expenditure.

Panel Boards—A 12-page bound booklet, prepared by Westinghouse Electric & Manufacturing Co., Brooklyn Works, 160 Seventh St., Brooklyn, N. Y., illustrates and gives typical specifications for panel boards. Known as special bulletin 1890.

Mixer for Dry Materials—A vertical mixer, equipped with a hoist elevator and packaging hopper, is described and illustrated in a folder prepared by Reeder & Company, Hughesville, Pa.

Loaf Molders — Molders designed to stretch and knead dough are illustrated and described in an 8-page booklet prepared by the Peerless Bread Machine Company, Sidney, Ohio.

Band Saw Type Bread Slicer—The J. H. Day Company, Cincinnati, Ohio, illustrates and describes its recently developed bread slicer in a carefully prepared folder.

Automatic Pan Greasing Machine—Larson Machine Company, Oakland, Calif., in an illustrated leaflet describes its pan-greasing machine that eliminates all manual labor and saves 50 per cent in oil used.

Presses—In a 74-page booklet known as catalog No. 48-C the Dunning Boschert Press Company, Syracuse, N. Y., illustrates, describes, and gives specifications concerning the different types of presses manufactured and installed by it.

Automatic Controller — Cutler-Hammer, Inc., 12th St. & St. Paul Ave., Milwaukee, Wis. announces its automatic controller for a.c. multi-speed motors.

Coffee Can—In an illustrated leaflet the Cameron Can Machinery Company, 240 North Ashland Ave., Chicago, Ill., describes its No. 83 Cameron Body Maker with necking-in and flanging attachment machines for the manufacture of coffee cans.

Food Refrigeration System—In a 15-page booklet the Tyler Kay Company, 775 Main St., Buffalo, N. Y., has published a paper of H. Tyler Kay and D. Walker Hannible entitled "One Hundred Million Dollar Refrigeration Investment Opportunities for Quick-Frozen Foods Industry."

Multi-V-Drive Belt—In an 8-page illustrated booklet, known as Bulletin L-400, -I, the Worthington Pump & Machinery Corporation, 2 Park Ave., New York, describes its Multi-V-Drive power transmission and indicates how to make measurements for the installation of one of these drives.

Crackling Press—In an 8-page illustrated booklet, the Dunning & Boschert Press Company, Inc., Syracuse, N. Y., describes the construction and operation of its hydraulic presses, designed especially for pressing of cracklings. Attention is also called to its hydraulic steam pumps and valves.

Industrial Fumigation—In a 32-page booklet, published May 1, 1930, the Carbon & Carbide Chemicals Corporation, 30 East 42d St., New York, discusses industrial fumigation and by photograph illustrations indicates the use of ethylene dichloride mixture and carboxide as fumigants in various industries.

Alloy Castings—In an illustrated leaflet, the William J. Sweet Foundry Company, Newark, N. J., describes its alloy castings and gives a chart containing specifications and composition of the Sweet alloy castings.

Metal Caps—In the Phoenix *Flame* Magazine published June, 1930, the Phoenix-Hermetic Company, 14th Ave. and 38th St., Brooklyn, N. Y., treats the development and use of metal caps in a historical manner.

Chemicals — In a leaflet dated Oct. 15, 1930, the Roessler & Hasslacher Chemical Company, 10 East 40th St., New York, lists its chemical products and gives market prices.

Essential Oils and Flavors—In a 16-page booklet, George Lueders & Company, 427 and 429 Washington St., New York, list their products and give market prices.

Vegetable Oils—In attractively bound booklets, entitled "How Snowdrift Is Made," "Everyday Receipts," and "For Making Good Things to Eat," the Wesson Oil and Snowdrift People, 210 Baronne Street, New Orleans, La., describe the manufacture and use of their Snowdrift and Wesson oil products.

High Pressure Cleaning—In a leaflet illustrated by photographs and diagrammatic drawings, the Homestead Valve Manufacturing Company, Coraopolis, Pa., calls attention to the many uses for its "Hypressure Jenny" in industrial cleaning.

Invertase Solution—In a 12-page pamphlet The Nulomoline Company, 111 Wall St., New York, announces refined Convertit and gives several detailed formulas for its use in the manufacture of fondant cream.

Invert Sugar—In an illustrated 48-page booklet, The Nulomoline Company, 111 Wall St., New York, describes its product Nulomoline and gives instructions concerning its use in various types of confectionery goods. Complete formulas and working conditions are included.

Can Filling Machine—In an illustrated leaflet, the Ayers Machine Company, Salem, N. J., describes its improved cut string bean and tomato can filler.

Tomato Juice Extractor—In an illustrated leaflet the American Utensil Company, 10 South La Salle St., Chicago, Ill., describes its American Tomato Juice Extractor and gives suggestions on making tomato juice.

Kutmixer—In a folder illustrated by photographs and diagrammatic drawings the Hottmann Machine Company, 3325-3347 East Allen St., Philadelphia, Pa., describes and designates uses for its Kutmixer equipment.

Depth Gages—In an 8-page illustrated booklet, the King-Seeley Corporation, Ann Arbor, Mich., describes and indicates typical applications of its K-S Telegage, which is made in five models and designed for indicating the depth of liquids located at a distant point or in places not easily accessible.

News of the Month

Packers Fight Against Consent Decree Aided by Many Witnesses

COUNSEL for the packers, the Government, and the wholesale grocers have signed stipulations that may bring to a close by Nov. 15 the hearings on the plea of Swift and Company and Armour and Company for modification of the consent decree to permit them to operate retail stores and handle unrelated products.

With 200 witnesses ready to testify in support of the contention of the packers that the new order in food distribution has removed any possibility of monopoly, the hearings which commenced Oct. 7 in the Supreme Court of the District of Columbia promised to continue indefinitely. An agreement of counsel on certain facts reached on Oct. 27, however, is expected to make it possible for the packers to conclude presentation of their evidence during first week in November. The rebuttal of the wholesale grocers' associations and the Attorney General's office in support of preserving the effectiveness of the decree is expected to be concluded a week later.

Prominent among those advocating a modification are livestock groups. Although prohibited from direct intervention in the case by the Court, they have been permitted to file briefs setting forth their points. Moreover, a number of representatives were called as witnesses by Frank J. Hogan, chief counsel for the packers. A reduction in the price "spread" from stock raiser to customer was held to be a possibility of modification.

The present importance of the chain stores, and their freedom to conduct operations which are forbidden to the packers, is perhaps the major premise on which justification for modification is based. Frank W. Wheeler, assistant to the president of the Great Atlantic & Pacific Tea Company, said that in 1920 his company had 4,638 stores with annual sales of $234,420,000, and that in 1930 it had 15,418 stores with annual sales of $1,053,692,000. He said that the first meat stores were opened in 1924, and that today 3,851 stores sell both meat and groceries. It was shown that A. and P. makes a net profit of 2½c. per $1.00 of sales, while Swift makes 1⅛c. and Armour less than a cent.

Elmer Palmer, an accountant for Kroger Grocery & Baking Company, said that this company had grown from 903 stores in 1920 to 5,575 stores in 1929. The company owns two packing plants and a sausage factory, he said. Representatives from National Dairy Products Corporation, Gold Dust Corporation, and similar enterprises of great magnitude and considerable diversification, were also called by the packers in efforts to show that other great organizations are carrying out operations as wide as those that the decree forbids the packers.

The great change in the retailing of meats that may come as a result of the development of quick-freezing was described by Frederick S. Snyder, chairman of the board of the Institute of American Meat Packers and president of Batcheldor, Snyder, Dorr and Doe, General Foods Corporation subsidiary which manufactures Birdseye "frosted" meats. This development, along with the general tendency toward the sale of products under brand names, can be turned to the benefit of the consumer more satisfactorily, it was maintained by counsel for the packers, if they were free to utilize to their fullest capacity such distributive facilities as they possess and to sell direct to consumers.

Opposition to the packers' contentions is being led by Harold B. Teegarden, of the anti-trust division of the Department of Justice. The National Wholesale Grocers' Association, the American Wholesale Grocers' Association, and the National Association of Retail Meat Dealers are again opposing any modification in the decree.

Dairy Industries Exposition Is Seen by Crowds at Cleveland

AS THE central point about which revolved numerous meetings devoted to all phases of the dairy industry, the fifth annual Dairy Industries Exposition, held in Cleveland, Ohio, justified the expectations of the thousands of delegates from all parts of the country who attended during the week of Oct. 20.

The first meeting of the week brought together about 1,500 representatives of the fresh milk industry from Oct. 20 to 22 for the 23d annual convention of the International Association of Milk Dealers. In addition to general sessions, sectional meetings, dealing with such specific interests as laboratory, plant, production, sales and advertising, and accounting, were centers of interest. One of the high points of the general session on Tuesday evening was a demonstration of a photoelectric device for detecting flaws in milk bottles, by its inventor, Professor A. L. D. D'Adrian, St. Louis, Mo.

At the convention of Dairy and Milk Inspection, held Oct. 22 to 24, there were papers on co-operative relations between inspectors and producers as well as more scientific studies on bacteriological testing and control.

A special program for dairy engineers took place on Oct. 23 under the auspices of the American Association of Agricultural Engineers. M. Van Antwerpen, of the standardization committee of the International Association of Milk Dealers, stressed the importance of the engineer in forwarding standardization work in this industry. A symposium on dairy plant layout and a discussion of heat transfer in dairy equipment were other high points in the engineer's session.

The 30th annual convention of the International Association of Ice Cream Manufacturers, which began on Oct. 23, brought another large group of delegates to the Exposition and to its own sessions. A joint meeting of the production and laboratory section with the Dairy Inspectors group was held on Thursday afternoon, and the mutual problems of the two groups discussed. The Sales Managers' Council and the Cost Council also held sectional meetings.

COMING EVENTS

NOVEMBER

6-8—National Cooperative Milk Producers' Federation, Des Moines, Ia.
8-15—Pacific Slope Dairy Show, Oakland, Calif.
10-14—American Bottlers of Carbonated Beverages, Milwaukee Auditorium, Milwaukee, Wis.
11-14—Association of Dairy, Food, and Drug Officials of the United States, New Orleans, La.
12—National Coffee Roasters' Association, New York City.
13-14—American Oil Chemists' Society, Congress Hotel, Chicago, Ill.
18-19—National Creamery Buttermakers' Association, Minneapolis, Minn.

DECEMBER

2-6—American Society of Refrigerating Engineers, New Yorker Hotel, New York City.
8-10—American Institute of Chemical Engineers, New Orleans, La.

Committee Urges Emergency Packing; Other News From Washington

By Paul Wooton
Washington Correspondent

FOUR FOODS not heretofore generally packaged for home use are included in the list recommended by the National Drought Committee for marketing in drought-stricken states. Dry skim milk, powdered yeast, wheat germs, and rice polishings should be made available in merchantable form, the committee said, in order to combat the spread of pellagra.

The committee, of which C. W. Warburton is secretary, has suggested that dry skim milk be packed in barrels for sale in bulk and in 2-lb. and 5-lb. cans; yeast in 100-lb. lots for sale in bulk and 1-lb. and 2-lb. packages; wheat germs in barrel lots; and rice polishings in 1-lb. and 2-lb. packages for family use.

The potential market for these products is large, comprising 2,000,000 farm families in 21 states. Because an unknown proportion of these families are actually in want and the income and food supply of practically all of them has been curtailed by the drought, George E. Farrell, assistant secretary of the committee, emphasized that the items comprising the anti-pellagra diet should be marketed to sell at the lowest possible prices. He urged co-operation from food manufacturers and distributors in providing the proper food supplies, declaring that it is in their own interest to protect the public health, because a sick man is not a good customer.

The committee's list also includes such ordinary items as evaporated milk in 1-, 2-, and 3-lb. cans; tomatoes and spinach in No. 3 cans; raw cabbage; cod liver oil of good quality in one-pint bottles; cane or sorghum molasses in ½-gal. pails; and light salmon in No. 2 cans.

The Bureau of Chemistry and Soils discovered a year ago that, next to yeast, cottonseed meal contains the highest concentration of the anti-pellagra vitamin G and is a great potential source of protein. This product is not yet available for use as food, but the possibility of its utilization is regarded as no more remote than was that of cottonseed oil before it was converted by Dr. Wesson into a palatable salad oil. Dr. W. H. Sebrell, of the Public Health Service, now is engaged in research intended to render the meal fit for use as food. Numerous inquiries have been received concerning the availability of meal so refined that it may be included in the human diet, but the evident demand cannot be satisfied until further investigation produces a method of processing that will be commercially practicable.

Canning Crop Estimates

The Oct. 13 estimate of snap beans for canning, based upon reported yields per acre, is 85,820 tons, compared with a production of 90,670 tons in 1929, or about 5 per cent below the high production of last year. The 1930 estimate of production, however, is approximately 50 per cent higher than the five-year average production during 1924-1928, due to the rapid expansion of acreage in the past two seasons.

Based upon actual and probable yields reported by canners, production of green lima beans for canning or manufacture will be 15 per cent less than production in 1929. The 1930 acreage, according to reports from 47 firms, is 27 per cent larger than that grown last year. The average yield per acre is only two-thirds of last year's yield.

The Commerce Department's estimate placing the pea pack at 22,035,212 cases has been criticised by canners as too high. The Wisconsin Canners' Association previously had estimated the pack in that state at 9,602,063 cases, compared with the department's estimate of 10,491,727 cases. Distributors used the report to charge canners with underestimating the supply.

As the milk-producing area in the northern tier of states was not affected by the drought, there is no danger of a shortage of butter or other dairy products. The tenor of the reports of the Department of Agriculture is that expansion of the industry may be carried too far. Local scarcity of milk supplies in drought-stricken areas is inevitable, because of the shortage of feed and consequent increase in production cost. Some dairies are going out of business, but the greatest shortage will result from the low production of the family cow.

The poultry and egg outlook is uncertain. The decrease in the number of laying hens coupled with smaller layings per hen, due to scarce feed, probably will reduce the egg supply, but to what extent is not predictable. Feeding of wheat to livestock has cut into the 200,000,000 bu. surplus, but the supply for milling remains more than ample.

1929 Tin Can Production

An increase of 15 per cent in the production of tin cans and other tinware in 1929, as compared with 1927, is reported by the Census Bureau. The 1929 total for the industry proper was $284,288,513, as compared with $247,132,963 in the last preceding census year.

The greater part of the increase in production was concentrated in sanitary cans and hole-top cans, including cans for condensed and evaporated milk. The output of sanitary cans numbered 5,437,149,793, valued at $125,983,625, as compared with production in 1927 of 4,286,711,908, valued at $97,742,906. Hole-top cans produced last year numbered 1,848,881,187, with a value reported at $25,855,002, as compared with the 1927 output of 1,180,693,414, valued at $17,751,566.

New Yorkers Plan to Form Cereal Chemists' Section

PLANS for the formation of a New York Section of the American Association of Cereal Chemists were made at a meeting held at the Hotel Governor Clinton, on Saturday evening, Sept. 27. Among the twenty who attended were three former presidents and the present head of the national body.

Bert D. Ingels, manager of the flour department of Wallace & Tiernan Company, Inc., Newark, N. J., was named chairman of the temporary club which will make application for a charter. Another meeting of the group will be held at 7 p.m. on Tuesday, Nov. 4.

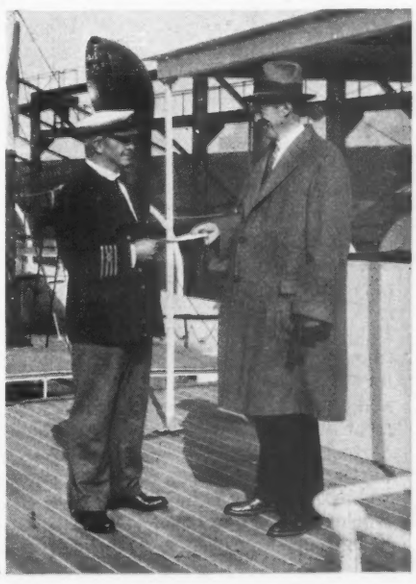
Date Shipment From Iraq Here in Record Time

A NEW RECORD of 23 days from Basra, Iraq, to New York was set by the S.S. "Gorjiston" as she steamed into port on Oct. 4 with 180,000 boxes—some 5,000 tons—of Mesopotamian dates. Her arrival marked the end of the annual race to be the first on the market with the new crop, and this time rival craft were outdone by nearly a week.

At a brief ceremony immediately upon arrival of the vessel, Capt. Henry D. Peeps was presented a bonus for the fast time in which he brought the $1,500,000 cargo on its long journey from the historic banks of the Tigris. The bonus was presented by William Buckley, transportation manager of Hills Brothers Company, New York, date packers who had chartered the ship.

The Hindu crew donned their embroidered ceremonial gowns to mark the end of the successful voyage. Meanwhile, stevedores opened the holds and rigged the booms, and in less than an hour after the ship docked, boxes of dates were being swung out of her hold.

Captain Peeps receives the bonus



Automatic packaging machine encloses two frozen fish steaks in attractive "window-type" cartons

Business Starts the Long Upward Climb

As FOOD INDUSTRIES goes to press, there is a more optimistic tone discernible in most business reports, although the general level of business remains fairly constant at the low level that has held for several weeks. Various indicators of general conditions are steady or have fallen slightly, and the composite index of *The Business Week* now stands at 84.7 per cent of normal, whereas in the October number of FOOD INDUSTRIES it was at 85.6 per cent.

In spite of this drop in the indices, general conditions continue to improve, except in the security markets, where the condition shows little change. In building construction, the clear signs of revival in the residential section are a good omen. Raw material purchases are increasing. Commodity prices have tended to hold steady.

Speaking specifically of the food industries, the situation continues to be better than in many other lines. The last few weeks have seen a slight rise in the index of wholesale food prices, although it is still some 12 per cent below 1929. Earnings reports for the first nine months of the year show that most food manufacturers and distributors have been operating at a profit, while, in some outstanding cases, nets have been appreciably higher than for the corresponding period of 1929.

Retail business through grocery stores shows a satisfactory condition, according to the October figures. A survey made by *The Progressive Grocer,* covering 1,300 stores, shows that 47 per cent report decreased sales; 9.3, steady sales; and 43.7, increased sales, as compared with last year. The gains made by the 43.7 per cent equal within 3 per cent the losses made by the 47 per cent.

The general level of wholesale prices is increasing slightly, according to the New York *Times,* which reports an increase from 84 to 84.2 per cent in the Bureau of Labor Statistics index. Prices of farm products showed an average gain of 9.5 per cent, large decreases in grains and cotton being more than offset by increases in beef steers, hogs, poultry, eggs, and potatoes. Foods as a whole rose appreciably, the net increase being nearly 2½ per cent.

The above reports indicate that business has slowly started to regain the ground lost last winter. The rate of improvement appears to be too slow to bring an end to business difficulties during the current winter, but every sign points to the beginning of a slow, but definite, upswing of the pendulum.

Liquid Sugar Is Not Sirup Government Rules

A MIXTURE of sugar and water, even when below 50 deg. in polariscopic test, cannot be classified as sirup under the Tariff Act of 1930, the Treasury Department maintains. Although admitting that the wording of the law if interpreted literally might bring the product under the "sugar-sirup" provision, with duty at the rate of 0.25c. per gallon, the "spirit and intent" of the law are clearly otherwise, it was pointed out in a letter to customs collectors on Oct. 4. The product, despite its liquid state, is "in essence a sugar" and dutiable at 1.7125c. per pound as sugar testing less than 75 deg.

The decision was made necessary by the arrival in various ports of several tank steamers containing the liquid product. The Pennsylvania Sugar Company is said to be the importer which had the protest carried through to a final ruling. A case in which the duty as sugar would have been $50,000 and as sirup but $930 was cited by the Bureau of Customs.

Probability that the matter may go to the courts for final adjudication was mentioned by the Treasury Department, according to the *United States Daily.* To sustain the claims of the importers would make the sugar tariff "nothing short of a joke," is was said.

Fish Steaks Sell Well In Syracuse

THE sales campaign for Nordic fish steaks now under way in more than 250 retail food stores in Syracuse, N. Y., is resulting in further justification for this method of distributing fish. The drive was opened a little over a month ago with a banquet attended by the mayor, dietetic authorities and prominent business men. Since that time a steady demand for the steaks has been built up throughout the city. Distribution has been handled by the Tobin Food Company, of Syracuse, and about 75 per cent of the available stores in the region are handling the product. New Orleans, La., Cedar Rapids, Ia., and Roanoke, Va., have been selected by the Atlantic Coast Fisheries Company for similar campaigns in the near future.

The fish "steaks" differ from ordinary fillets in that they are cross-sections formed by compressing fillets into a continuous cylindrical mass which is then cut in slices of uniform thickness. This not only aids in adjusting the freezing time, but simplifies the packaging of uniform weights. The steaks are packed two to a box in cartons with a Cellophane window. The net weight of the package is 8 oz., said to represent 2 lb. of live-fish weight, and sells for 22 cents.

Marketing of fish in packages, along with the process of quick freezing, has been chiefly responsible for the rapid expansion of the fishing industry in recent years, according to the U. S. Bureau of Fisheries. Landing of fish at Boston and Gloucester, Mass., and at Portland, Me., in 1921 were about 150,000,000 lb. and had been nearly stationary since the opening of the century. Packaged fish was first marketed in that year, and by 1929 landing of fish at these ports had risen to 322,000,000 lb. per year. Last year 84,000,000 lb. of packaged fish were marketed, of which 85 per cent was haddock.

For the first eight months of 1930, landing of fish in the three ports totaled 248,360,201 lb., compared to 220,352,249 lb. for the first eight months of 1929. A considerable part of this steady rise is ascribed to the increased public demand which has come as a result of the advertising of brand names made possible by packaged products.

Modern Distribution Methods Discussed By Meat Packers at Chicago

PREDICTIONS of decided changes in methods of distributing and merchandising meats were given practical substantiation by the great interest accorded them at the twenty-fifth annual convention of the Institute of American Meat Packers held in Chicago, Ill., Oct. 17-22. The several hundred meat packers, representing plants whose sales aggregate about three billion dollars yearly, discussed technical problems and heard addresses by national figures in various branches of the food industries.

The first two days of the meeting were devoted to sectional meetings dealing with specific technical and sales problems. "The Model Packing Plant of 1930," by Myrick D. Harding, general superintendent of Armour & Company, presented at the meeting of the operating section on Friday, Oct. 17, was of particular interest.

At the first general session, held on Monday, Oct. 20, William Whitfield Woods, president of the organization, spoke on the general condition of the industry, bringing out the fact that most meats are wholesaling at present from one-fifth to one-third lower than they were a year ago. "Following a decided improvement in demand which became apparent about two months ago," he continued, "prices have strengthened somewhat from the relatively low levels reached during the summer."

The futility of price cutting was emphatically brought out by Frank M. Firor, president of Adolf Gobel, Inc., New York City. Citing his company's success in maintaining a uniform price within a buying area by means of a printed price list sent to dealers at regular periods, Mr. Firor urged that quality, rather than price, be considered the basic factor by both buyer and seller.

That the development of quick-frozen, packaged meats offers a solution to many of the ills now vexing the packing industry was maintained by Marion Harper, vice-president of General Foods Sales Company. An investment on the part of a retailer of $1,600 gives him far more satisfactory equipment for handling the same volume of meats in packaged, quick-frozen form than can be obtained for $3,500 invested in meat-market equipment of the old type, he said. Admitting former difficulties with refrigerated showcases, he said that several manufacturers had now perfected efficient units of this type. He pointed out that the meat packing industry's greatest problem is securing additional retail outlets, and that packaging and freezing can make it possible for meat distribution to reach the intensive retail coverage now attained by other packaged food items.

The benefits of packaging meat cuts for the retail trade, without making use of freezing, were discussed by Samuel Slotkin, president of Hygrade Food Products Corporation, New York City, and H. C. Bohack, president of H. C. Bohack Company, Brooklyn, N. Y.

John R. Mohler, of the U. S. Department of Agriculture, also predicted the advance of packaged meat cuts, emphasizing the fact that under the present system, it takes longer to purchase meat than any other food item. "The butcher of the future," he suggested, "may occupy a position similar to that of a chef in a restaurant, and the clerks may be comparable to waiters."

On Wednesday, Oct. 22, the meat packers joined with other groups in the Seventh Conference of Major Industries, at which "The Current Situation" was the subject under discussion.

World-wide Sugar Curtailment Seems More Probable

SOME sort of world-wide stabilization plan for sugar production seems destined to evolve from the unrelenting efforts of the committee headed by Thomas L. Chadbourne in Cuba and similar groups in other sugar producing countries. Viriato Gutierrez, president of the Cuban Senate and Mr. Chadbourne had planned to sail for Europe on Oct. 29 to begin negotiations with foreign sugar interests, but postponement of the conference until the Cuban Legislature officially adopts the plans of the committee was announced on Oct. 28. It is expected that the first negotiations will be with the Javan Sugar Trust, which has produced practically all of the sugar used in the Far East and a considerable portion of that consumed by sugar-buying countries in Europe.

Opposition to the Chadbourne plan in Cuba is still great, but is primarily based on the fact that Java has a surplus of 750,000 tons of raw sugar that Cubans fear will find its way into United States markets should they agree to restrict their own supply. If the Javan Trust will enter some sort of a co-operating agreement, much of the Cuban opposition will also be overcome. It is generally believed that Java will be asked to reduce its 1930-1931 crop by 10 per cent. Negotiations for production agreements with sugar producers in Germany, Czechoslovakia, Poland, Belgium, Great Britain, and Hungary will also be sought by the delegates.

Although most of the comments on the plans made by domestic beet and cane producers have been unfavorable, there is a general feeling that this is not an unsurmountable difficulty. On this point Mr. Chadbourne is quoted as saying, "The committee and the Cuban planters have absolutely no fears that the American planters will increase crops next year. It is so much to their advantage not to do so. Cuba is limiting her exports to 2,800,000 a year and has removed from competition with American growers from 300,000 to 500,000 tons a year."

TRADE NOTES

WALTER BAKER & CO., INC., a subsidiary of the General Foods Corporation, recently filed suit in the United States District Court to obtain exclusive use of its trademark "Baker's," which, it charges, has been appropriated by W. H. Baker, Inc., another chocolate manufacturer. The plaintiff seeks to restrain Thomas E. Robertson, Commissioner of Patents, and W. H. Baker, Inc., from taking advantage of a "purported cancellation" of the plaintiff's trademark rights, signed by the commissioner.

BORDEN COMPANY has announced the formation of a Canadian holding corporation to control all of the operating companies in Canada. It was thought that the further development of the company's business in Canada would be made easier by the unification of management of the various subsidiaries.

CHERRY-BURRELL CORPORATION, Chicago, Ill., have acquired Storer, Rodgers, and Hughes, Ltd., London, England, a well-known firm engaged in the distribution of milk-handling equipment, it was recently announced.

CREAMERIES OF AMERICA, INC., which was organized in Los Angeles, Calif., a year ago, has acquired the Honolulu Dairymen's Association, Ltd., of Honolulu, T. H., a $2,000,000 holding company. Creameries of America now operates throughout twelve states. The Honolulu Dairymen's Association, Ltd., is a large distributor of ice cream, milk, butter and other dairy products. It owns the Oahu Ice and Cold Storage Company on the island, which comprises the city and county of Honolulu, and manufactures most of the ice cream consumed in that territory. It handles imports of perishable goods from the United States mainland, Australia, New Zealand, and the Philippine Islands. It likewise owns the Rawley's Ice Cream Company, Ltd., and its operations embrace imports of cattle sold to dairymen on the island and an extensive feed business.

GENERAL FOODS CORPORATION has arranged a contract with the Glidden Company, of Cleveland, Ohio, for the distribution and sale of certain products of Durkee Famous Foods, Inc., throughout the United States, it was announced on Oct. 9. These products include Troco Nut Margarin and other items suitable for distribution on the trucks operated by the subsidiaries of the General Foods. Net earnings of General Foods Corporation and subsidiary companies for the nine months ended Sept. 30, were $15,515,280, after all charges and expenses, including reserve for Federal income taxes it was announced on Oct. 24. These earnings are equivalent to $2.93 per share on the 5,288,795 shares of no par common stock outstanding as of Oct. 1, 1930. For the first nine months of 1929, General Foods Corporation, as then constituted, showed net profits of $14,840,252, equivalent to

$2.83 per share on 5,248,624 shares of no par common stock outstanding Oct. 1, 1929.

GOLDEN STATE MILK PRODUCTS COMPANY, San Francisco, Calif., has undergone reorganization and is now functioning as the Golden State Company, Ltd., of Delaware. Stock in the former company will be exchanged for stock in the new company on a share for share basis. When that and other necessary legal details have been attended to, an election of officers will be held. It is expected that officers of the Golden State Milk Products Company will continue as officers of the Golden State Company, Ltd., of Delaware.

JEWEL TEA COMPANY has withdrawn from participation in the recapitalization plan of the Van Camp Packing Co., Inc., it was recently announced. Jewel Tea was to have supplied one-half of the $2,500,000 new capital to be obtained by Van Camp.

KELLOGG COMPANY, Battle Creek, Mich., announced on Oct. 9 that it would place its employees on a five-day week basis, in order to give employment to about 300 additional men. W. K. Kellogg, chairman of the board, said that the present working force of 2,500 was greater than that employed a year ago.

PAGE & SHAW, INC., well known candy concern of Boston, Mass., which recently went into bankruptcy, has announced through its lawyers a proposal for reorganization.

PFAUDLER COMPANY and the GENERAL AMERICAN TANK CAR COMPANY have formed an organization to be known as the General American-Pfaudler Corporation of Delaware to handle glass-lined refrigerator tank cars.

NATIONAL DAIRY PRODUCTS CORPORATION, through its subsidiary, National Juice Corporation, has made an agreement with the Florida Citrus Exchange, Tampa, Fla., for house-to-house distribution of orange juice. The company will extract the juice and freeze it in Florida, and then ship the product north for defrosting and bottling.

STANDARD BRANDS, INC., have announced that sales of Chase and Sanborn coffee for September achieved the greatest volume for any month in the company's history. Joseph Wilshire, president of Standard Brands, said "Looking over statistics on sales for the first nine months of 1930, I find that our old line products, such as Fleischmann's yeast, Royal Baking Powder, and Malt Products, show a very substantial and gratifying increase over the same period of last year."

WARD BAKING CO., New York City, is in the midst of a struggle for executive control in which a group headed by George K. Morrow, chairman of the board of the Gold Dust Corporation, is endeavoring to oust the present management. The Morrow group has sent out an appeal for proxies for a special meeting to elect a new board of directors. George B. Smith, a former president of the baking company, is supporting the Morrow interests. In a recent letter to stockholders, the present management defended its policies, and ascribed the decline in earnings to the general business depression.

PERSONALS

HENRY ARNSTEIN, who is acting in an advisory capacity to the governments of Argentina, Brazil, Cuba, and Colombia on several problems in food chemistry, recently sailed for South America to deliver a series of papers on the utilization of natural resources, the elimination of waste and the recovery of byproducts.

LEE ASH, formerly factory superintendent for Mirror Candy Stores, is now with E. J. M. Colby, Inc., New York, in a similar position.

W. W. CARROLL has been named as supervising engineer of plant operations in the East for Adolf Gobel, Inc., meat product manufacturers.

JOSEPH A. CRAIG, formerly assistant aquatic biologist of the Bureau of Fisheries, U. S. Department of Commerce, has been named head of the Pacific Coast Division of the Bureau, to succeed WILLIS H. RICH, who has accepted a professorship at Stanford University. Mr. Craig has recently been engaged in a statistical study of the variations in abundance of Columbia River salmon.

GEORGE A. DAUT, former business manager and secretary of the Ohio Bakers' Association, has been appointed representative of the Moore Lowry Milling Co., Kansas City, Mo., in the Ohio and West Virginia territory. He succeeds HARRY BRYANT, who died a few weeks ago.

RICHARD R. DEUPREE, is now president of Procter & Gamble Co., succeeding WILLIAM COOPER PROCTER, who recently resigned the presidency to become chairman of the board of directors. Mr. Deupree was formerly vice-president and general manager of the same organization.

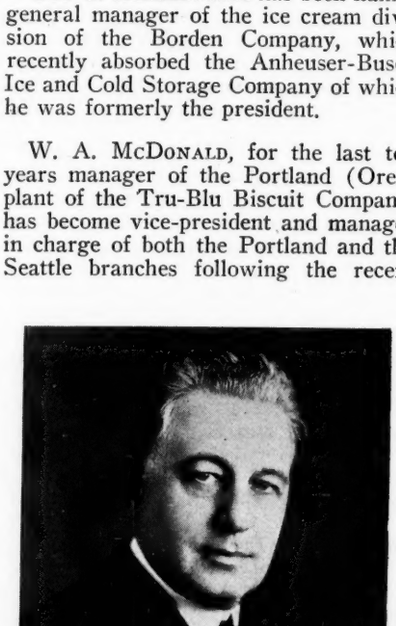
MRS. JOHN T. DORRANCE, widow of Dr. John T. Dorrance, late head of the Campbell Soup Company, was elected a director of the company on Oct. 9 to fill a vacancy caused by her husband's death. ARTHUR C. DORRANCE, formerly vice-president and general manager, has been made president, and GEORGE M. DORRANCE another brother of the former president, has been made chairman of the board of directors, a newly created position. HERBERTON L. WILLIAMS was elected vice-president in addition to the position of treasurer, which he already held.

ROY M. HAGEN, for the past several months assistant general manager of the Sun-Maid Raisin Growers of Delaware, Fresno, Calif., has been named general manager. He succeeds CARLYLE THORPE, who resigned to return to his position as general manager of the California Walnut Growers' Association, Los Angeles, Calif.

WETMORE HODGES, chairman of the board of General Seafoods Corporation, and EDWARD R. TINKER, president of Interstate Equities Corp., were recently elected directors of General Foods Corporation.

GUS G. KINDERVATER has been named general manager of the ice cream division of the Borden Company, which recently absorbed the Anheuser-Busch Ice and Cold Storage Company of which he was formerly the president.

W. A. MCDONALD, for the last ten years manager of the Portland (Ore.) plant of the Tru-Blu Biscuit Company, has become vice-president and manager in charge of both the Portland and the Seattle branches following the recent merger of the Tru-Blu company with the Loose-Wiles Biscuit Company. Mr. McDonald has served as president of the Western Confectioners' Association and is now a member of the executive board of the National Confectioners' Association.



W. A. McDonald

FRANK MEYER of Standard Brands, Inc. and Charles Janssen, secretary of the National Retail Grocers' Association, recently sailed for Europe to study possibilities of the formation of an international grocers' association.

LEO C. MONAHAN, formerly director of the California Grape Control Board, has accepted a position as sales executive with the Hawaiian Cane Products Co., Ltd. He took over his new duties on Oct. 15. Mr. Monahan also has served as vice-president and manager of the department of public relations of the California Vineyardists Association.

E. J. NOBLE, president of Life Savers,

Inc., has been elected a director of Drug, Inc.

R. L. PURDON, formerly of the foodstuffs division of the U. S. Department of Commerce, has been made assistant chief of the marketing service division of the department.

WILLIAM F. ROBERTSON is in charge of the new soda fountain, crushed fruit, and sirup department of Park & Tilford, New York City. Mr. Robertson was formerly connected with the research and technical development division of the Pfaudler Company, Rochester, N. Y.

ALBERT F. SCHMUDDE, has succeeded the late C. D. Craig, as secretary of Bowey's, Inc., Chicago Extract & Chocolate Manufacturers. Mr. Schmudde was formerly vice-president and general manager of Hardinge Bros., Inc., machinery manufacturers.

F. L. VAN ORMAN has been named general manager of the Andrus-Scofield Co., manufacturers of coffee, peanut butter and several other food products at Columbus, Ohio. STEELE CONAWAY has been made sales director of the company.

J. FRANK WEIR has been appointed manager of the Columbus (Ohio) branch of the General Baking Company. Mr. Weir has been with the company for 13 years, and goes to Columbus from Reading, Pa., where he was branch manager.

W. B. WHITE, chief of the food control laboratory, Food and Drug Administration, U. S. Department of Agriculture, has been appointed a member of the Food Standards Committee, it was announced on Oct. 14. This appointment fills the vacancy which has existed for some time since the death of DR. R. W. BALCOM, former chief of the food control laboratory. Dr. White was connected for 20 years with the New York State Bureau of Chemistry.

ALBERTUS WILLARDSON, formerly vice-president and assistant general manager of the Utah Poultry Producers Association, has been made marketing specialist of the poultry section of the Division of Co-operating Marketing by the U. S. Federal Farm Board.

OBITUARY

PERRY BUCKLES, president of the Tip Top Canning Co., Tippecanoe City, Ohio, and owner of a canning factory in Covington, Ind., died in Piqua, Ohio, Sept. 26. He was 54 years of age.

LEWIS M. COLE, president of the Royal Packing Company, Los Angeles, Calif., and United States Food Administrator for southern California during the World War, died on Oct. 1 in Los Angeles at the age of 60.

JAMES E. CRASS, president of about 24 Coca-Cola bottling companies in Virginia and other nearby states, died suddenly on Sept. 22, at the age of 64. Mr. Crass was a resident of Richmond, Va.

S. GUMPERT, president of the S. Gumpert Co., Inc., Brooklyn, N. Y., baking establishment, died on Oct. 12, at the age of 68.

HERBERT A. HILDRETH, president and treasurer of the H. L. Hildreth Company, Newton, Mass., candy manufacturers, died on Oct. 2 at his home in Newton.

MISS JULIA C. MONTAGUE, head of Montague & Co., Philadelphia, Pa., manufacturers of confectionery, died on Oct. 5, in Ventnor City, N. J.

CHARLES SUTHER, president of the Charles Suther Packing Co., Dayton, Ohio, died at his home in that city on Oct. 10. Mr. Suther came to America from Germany in 1871 and started manufacturing sausages there in 1876. He was 77 years of age.

THOMAS VAN LOAN, head of the New York Coffee & Spice firm bearing his name, died in Brooklyn on Oct. 13 at the age of 85. Mr. Van Loan had visited his office daily until ten days before his death. He was a member of the American Spice Trade Association.

New Construction

Bakery — Brown, Greer & Co., 415 Union Ave., Knoxville, Tenn., plans the construction of a 1 story, 100 x 200 ft. bakery. W. E. Long & Co., 155 North Clark St., Chicago, Ill., are architects.

Bakery—Brownel Realty Co., c/o H. Holder, 242 Franklin Ave., Brooklyn, N. Y., Archt., is having plans prepared for the construction of a 1 story, 50 x 100 ft. bakery at Third St. and Abington Ave. Estimate cost $40,000. Dugan Bros. Inc., 161 Abington Ave., lessee.

Bakery—Butter Nut Bread Co., c/o A. C. Worthen and O. J. Johnson, Texarkana, Ark., will soon receive bids for the construction of a bakery, 20,000 loaves daily capacity, at 10th and State Line Sts. $50,000. Machinery and equipment to cost $35,000 will be required.

Bakery — Duquesne Baking Co., J. P. Williams, 223 Auburn St., Pittsburgh, Pa., plans to rebuild bakery on Auburn St. destroyed by fire. Estimated cost $150,000. Architect not selected.

Bakery—L. W. Folsom, 1526 West Burnett St., Long Beach, Calif., awarded contract for a 1 story, 80 x 110 ft. bakery at 2412 Perris Ave., to F. E. Tucker, 913 Olive St., Long Beach. $12,000.

Bakery—General Baking Co., 420 Lexington Ave., New York, N. Y., plans to remodel bakery at Hutchinson, Kan. Archer & Gloyd, 916 Pioneer Trust Bldg., Kansas City, Mo., are architects.

Bakery, etc.—Keonig Lesser Corp., 391 East 149th St., New York, N. Y., awarded contract for a 1 story, 100 x 100 ft. bakery and stores building at Lydia and Barnes Sts., to York Building Co., 151 West 42nd St., New York. Estimated cost $40,000.

Bakery — M. & L. Bakery Co., c/o F. A. Maxeiner and F. W. Lenhart, 502 West 3rd St., Sioux City, Ia., awarded contract for the construction of a 2 story, 88 x 183 ft. bakery at 6th and Perry Sts. and Wesley Ave., to H. S. Holtze, Sioux City. Estimated cost $75,000.

Bakery — Seven Baker Bros., L. J. Baker, Pres., 400 Wabash Ave., Pittsburgh, Pa., is having plans prepared for the construction of a bakery on Mill St., Uniontown. Estimated cost $150,000. Braziell & Anderson, 309 4th Ave., Pittsburgh, are architects.

Bakery — G. F. Stuhmer & Co., E. S. Bryezynski, Pres., 570 7th Ave., New York, N. Y., will soon award contract for addition to bakery and storage building at Park Ave. and Taaffe Pl., Brooklyn. Estimated cost $40,000. J. H. Knubel, 570 7th Ave., New York, is architect.

Bakery — Sussman Bros., 547 Grand Ave., Astoria, N. Y., will soon award contract for the construction of a bakery. Estimated cost to exceed $40,000. J. H. Galloway, Jackson Heights, N. Y., Archt.

Bakery Distribution Warehouse — National Biscuit Co., 715 Chamberlain Ave., New York, N. Y., awarded contract for a 1 story, 54 x 126 ft. distribution warehouse at Knoxville, Tenn., to V. L. Nicholson Co., 102 West Clinch Ave., Knoxville. Estimated cost $40,000.

Bakery Warehouse — K. Ahinger and J Tierney, 324 West 48th St., Los Angeles, Calif., had plans prepared for the construction of a 1 story, 100 x 125 ft. bakery warehouse at 1000 Towne Ave. Estimated cost $14,000. Work will be done by owner's forces under the supervision of W. J. Moran.

Biscuit Factory—Christie, Brown & Co. Ltd., 192-202 King St. E., Toronto, Ont., plans the construction of a 2 story, 125 x 462 ft. plant, etc., at Notre Dame and Winnipeg Aves., Winnipeg, Man. Estimated cost $750,000.

Bottling Plant—Alabama Coca Cola Bottling Co., J. Eros, Gen. Mgr., Anniston, Ala., is having plans prepared for the construction of a 1 story bottling plant at Swainsboro, Ga. Estimated cost $40,000. Pringle & Smith, Norris Bldg., Atlanta, Ga., are architects.

Bottling Plant—J. T. Haley, Cuthbert, Ga., will soon award contract for a 2 story, 53 x 80 ft. bottling plant. Dennis & Dennis, 556 Mulberry St., Macon, are architects.

Bottling Plant — L. Yunckers, 858 Massachusetts Ave., Indianapolis, Ind., awarded contract for the construction of a bottling plant to W. P. Jungclaus, 825 Massachusetts Ave., Indianapolis. Estimated cost $50,000.

Bottling and Pasteurization Plant — Owner, c/o W. N. Toepke, 74 New Montgomery St., San Francisco, Calif., Archt., postponed construction of bottling and pasteurization plant at Burlingame. $50,000. Maturity indefinite.

Brewery, Ice Manufacturing Plant, etc.—Rubsam & Horrman Brewing Co., 191 Canal St., Stapleton, N. Y., will soon receive bids for the construction of a brewery, ice manufacturing plant and storage building. Estimated cost to exceed $300,000. Architect not selected.

Canning Plant—Campbell Soup Co., c/o Continental Can Co., 1 Pershing Sq., New York, N. Y., awarded contract for a 6 story canning plant at Arch, Front and Second Sts., Camden, N. J., to Cramp & Co., Denckla Bldg., Philadelphia, Pa. Estimated cost $150,000.

Canning Plant—Ridge Canneries Co., H. S. Norman, Prop., Lake Wales, Fla., awarded contract for a 100 x 200 ft. canning plant to Arch Engineering & Construction Co., Lake Wales.

Canning Plant (Potato) — Southern Potato Products Co., c/o G. C. Richardson, Brownsville, Tex., will soon award contract for the construction of a 1 story plant. Private plans. Machinery and equipment will be required.

Creamery Plant — Lorain Creamery Co., Lorain, O., awarded contract for a 1 story, 55 x 115 ft. creamery plant at 144 Oberlin St., to H. J. Leighton, 783 6th Ave., Lorain. Estimated cost $40,000.

Creamery Plant—United Farmers Corp., 98 Cambridge St., Charlestown, Mass., awarded contract for addition to creamery, to F. J. Gallagher & Co., 580 Huron Ave., Cambridge. $15,000.

Dairy Plant—County Commissioners, Evansville, Ind., will receive bids until Dec. 4 for the construction of a new dairy plant, power plant, stack and two new steam boilers. Estimated cost $65,000. A. E. Neucks, 604 Old State Bank Bldg., Evansville, is architect.

Dairy—Panthersville Honor Farm, c/o U. S. Dept. of Justice, H. F. Frick, Ch. Clk., Atlanta, Ga., will build a group of dairy buildings, 34 x 100, 30 x 80 and 24 x 50 ft. Estimated cost $50,000. Private plans. Work will be done by day labor.

Dairy Plant—Ballinger Co., 100 East 42nd St., New York, N. Y., Archts., are receiving bids for the construction of a 1 and 2 story dairy plant at Perth Amboy, N. J., for Industrial Realty Co., c/o architect (builder). Puritan Dairy Products Co., 683 New Brunswick Ave., Perth Amboy, N. J., lessee.

Dairy Plant — Roberts Sanitary Dairy Co., D. E. Roberts, Gen. Mgr., 809 Douglas St., Sioux City, Ia., is having preliminary plans prepared for a 2 story, 160 x 175 ft. dairy plant at West 14th and Omaha Sts. Estimated cost $100,000.

Dairy Plant Addition—Consumers Dairy Co., 400 45th St., Union City, N. J., awarded contract for a 2 story, 28 x 155 ft. addition to dairy plant at 45th St. and New York Ave. to Limouze Bros., 111 8th St., West New York. Estimated cost $45,000.

Dairy Plant Addition—Highland Dairy Ltd., 666 Ontario St., Toronto, Ont., is having plans prepared for a 2 story addition to dairy plant. Estimated cost $50,000. R. B. McGiffin, 24 Bloor St. W., Toronto, is architect.

Dairy Products Plant Equipment — Vangold Dairy Products Co., F. R. Corbett, Harmony, Pa., plans to purchase machinery and equipment for dairy products plant.

Dairy and Livestock Building — Connecticut Agricultural College, C. C. McCracken, Pres., Storrs, Conn., plans the construction of a dairy and livestock building. Estimated cost $100,000. Architect not selected.

Ice Cream Plant — Arundel Ice Cream Co., 1501 West Baltimore St., Baltimore, Md., awarded contract for a 2 story, 75 x 118 ft. ice cream plant, to Frainie Bros., 19 West Franklin St., Baltimore.

Milk Plant—Roberts Dairy Co., Sioux City, Ia., is having sketches made for the construction of a 2 story milk plant to produce bottled and powdered milk at Ninth and Omaha Sts. Estimated cost $100,000. G. B. Hilgers, U. B. Bldg., Sioux City, is architect.

Milk Plant—L. H. Weaver, Madison Ave., Indianapolis, Ind., awarded contract for the construction of a 50 x 65 ft. milk plant, to E. J. Kirsch, 57 Le Grande Ave., Indianapolis. Estimated cost $40,000.

Milk and Dairy Distribution Plant — A. H. Knauss, Geneva, N. Y., plans the construction of a milk and dairy distribution plant on Seneca St., Penn Yan. Estimated cost to exceed $150,000. Lessee probably Sheffield Farms, 524 West 57th St., New York.

Pasteurization Plant—Shepard Dairy, c/o L. J. A. Julianelle, 42 Church St., New Haven, Conn., Archt., awarded contract for the construction of a 1 and 2 story plant to L. J. Coffey, 40 Autumn St., New Haven. Estimated cost $40,000.

Cold Storage Plant—Shelburne Fisheries Ltd., Shelburne, N. S., plans the construction of a cold storage plant. Estimated cost $50,000.

Cold Storage Plant—U. S. Government, A. W. Parker, Const. Quartermaster, Schertz, Tex., received lowest bid for the construction of a 40 x 70 ft. post exchange building, including cold storage plant, etc., at Randolph Field, 14 mi. north of San Antonio from R. McKee, El Paso.

Cold Storage Warehouse—Alaga Syrup Co., L. B. Whitfield, Sr. Pres., North Court St., Montgomery, Ala., awarded contract for a 2 story cold storage warehouse to Jehie Bros., Shepherd Bldg., Montgomery. Estimated cost $25,000.

Ice Plant — Brown's Letters, Inc., c/o C. Leslie, Weir, 13 East 37th St., archt., New York, awarded contract for the construction of an ice manufacturing plant to P. M. Sterling, Huntington. Long Island Ice Corp., Huntington, lessee.

Ice Plant—A. C. Clausnitzer, New Braunfels, Tex., is having preliminary plans prepared for the construction of an ice plant at Kimbro and Second Sts., Taylor.

Ice Plant — Hennessey Ice Co., Hennessey, Okla., plans the construction of an ice plant to replace fire loss. $25,000. Private plans.

Ice Plant—J. A. Hill, 90 Pond St., Natick, Mass., will soon award contract for the construction of a 1 story artificial ice plant on West Central St. Estimated cost $75,000. C. Coneby Engineering & Construction Co., 1580 Ansol Rd., Cleveland, O., is engineer.

Ice Plant—Knickerbocker Ice Co., 41 East 42nd St., New York, N. Y., will soon award contract for the construction of an ice plant at Long Beach. Estimated cost $30,000.

Ice Plant—Magnolia Ice Co., Beaumont, Tex., will soon receive bids for the construction of a 45 ton ice plant at Lake Charles, La. Estimated cost $45,000. A. J. Alexander, Beaumont, Tex., is engineer.

Ice Plant—C. H. Murdock, Lakeland, Fla., plans the construction of an ice plant. Estimated cost $15,000. H. D. Mendenall, Lakeland, is architect.

Ice Plant—Quix Kold Corp., Oklahoma Savings Bldg., Oklahoma City, is having preliminary plans prepared for the construction of a dry ice plant at Norman. Estimated cost $40,000.

Ice Plant—Southern United Ice Co., Jackson, Miss., plans the construction of a 1 story ice plant at Newton. Estimated cost $20,000.

Ice Plant—C. H. Ziegler, 26 Journal Sq., Jersey City, N. J., Archt., will receive bids about Dec. 1 for the construction of a 1 story, 100 x 100 ft. ice plant including ice making machinery, tank, storage and office room, etc., for Mongiello Bros., 625 Communipaw Ave., Jersey City. Estimated cost $50,000.

Ice Manufacturing and Cold Storage Plant—Southwest Food & Refrigerating Co., Pampa, Tex., plans the construction of a 70 ton ice manufacturing and cold storage plant. Estimated cost $100,000. Private plans.

Refrigerating Unit — City of San Antonio, Tex., will soon award contract for supply and installation of a new refrigerating unit in old municipal market house. Estimated cost $30,000.

Refrigerated Warehouse — New York, New Haven & Hartford R.R. Co., Grand Central Terminal, New York, N. Y., awarded contract for the construction of a refrigerated warehouse at Locust Ave. and East 132nd St., to The Austin Co., 120 Broadway, New York. Estimated cost $175,000. The Great Atlantic & Pacific Tea Co., 420 Lexington Ave., New York, is lessee.

Alfalfa Meal Mill—Denver Alfalfa Milling & Products Co., Lamar, Colo., has work under way for rebuilding mill at McClave destroyed by fire. Estimated cost $25,000.

Flaking Mill — Tennessee Cereal Co., Independent Life Bldg., Nashville, Tenn., will soon award contract for a 2 and 4 story flaking mill at Franklin Pike. Estimated cost $150,000. Hart & Stone, Hitchcock Bldg., Nashville, are architects.

Grain Elevator—Pennsylvania R.R., Pennsylvania Station, Pittsburgh, Pa., awarded contract for a 110 ft. grain elevator, 1,300,000 bu. capacity, including conveyor house on top at Bay and Holland Sts., Erie, to Rust Engineering Co., Koppers Bldg., Pittsburgh. Estimated cost engineer, Central Region.

Rice Mill—Jonesboro Rice Milling Co., c/o H. E. Bovay, Pres., Dermon Bldg., Memphis, Tenn., awarded contract for the construction of a 4 story, 42 x 42 ft. rice mill at Jonesboro, Ark., to E. G. Hodges, Cotton Exchange Bldg., Memphis, Tenn. Estimated cost $125,000.

Grocery Plant—Helwig & Leitch Corp., 1533 Gorsuch Ave., Baltimore, Md., has awarded contract for addition to plant at 1640-1644 Gorsuch Ave., to J. F. Hemley, 1613 Abbottson St., Baltimore, and work is under way. This corrects report in September issue.

Produce Warehouse—Forty-Third St. Warehouse Co., Union Trust Bldg., Pittsburgh, Pa., awarded contract for rebuilding produce warehouse and office building at 43d St. destroyed by explosion, to Hillsmith & Co., Winters Bank Bldg., Dayton, O. Estimated cost $40,000. Great Atlantic & Pacific Tea Co., 1016 Grand Bldg., Pittsburgh, Pa., is lessee.

Lard Rendering Plant—Swift & Co., Packers and Exchange Aves., Chicago, Ill., plans improvements to lard rendering plant at Nuevo Laredo, Mexico. Private plans. Most of work will be done by day labor. Equipment will be installed.

Vegetable Terminal—Southern Pacific Lines, 201 St. Charles St., New Orleans, La., asked permission of city to acquire site and construct a 2 story vegetable terminal. Estimated cost between $800,000 and $1,000,000.

Vegetable Oil Plant—Canadian Vegetable Oils, Ltd., C. F. Millar, Pres., Vancouver, B. C., plans the construction of a plant east of Trinity St.

Pecan Plant — Nueces Valley Co-Operative Pecan Marketing Association, Uvalde, Tex., recently formed by S. H. Gibbons of Jackson, Miss., National Organizer of National Pecan Marketing Assn., plan the installation of a plant similar to one now under construction at Uvalde. Machinery and equipment will be required.

Popcorn Factory — George's Honeykist Popcorn Co., Inc., c/o L. J. A. Julianelle, 42 Church St., New Haven, Conn., Archt., will build a 1 story, 50 x 200 ft. factory at Orange. Estimated cost $55,000. Work will be done by owner's forces.

Salt Plant—Morton Salt Co., 208 West Washington St., Chicago, Ill., plans the construction of a 1 and 2 story salt plant at Grand Saline, Tex. Estimated cost $125,000. Part of work will be done by contract and part by day labor under the supervision of Allen & Garcia, McCormick Bldg., Chicago, Engrs.

Yeast Plant — Anheuser Busch Inc., 721 Pestlozi St., St. Louis, Mo., is having plans prepared for a 4 story, 100 x 110 ft. yeast plant at Old Bridge, N. J. Estimated cost $50,000. Stone & Webster, 120 Broadway, New York, N. Y., are architects.

Fish Hatchery—State Game, Fish & Oyster Commission, Austin, Tex., plans the construction of a complete fish hatchery at Huntsville. Estimated cost $25,000. Private plans.

Fishery and Packing Plant — Arthena Mine Fishery & Packing Co. Ltd., Ingonish, N. S., plans the construction of a new plant. Estimated cost $125,000.

Egg Candling Plant — Midvale Poultrymen's Association, H. Grass, Pres., Midvale, Utah, plans the construction of a 1 story, egg candling plant. Estimated cost $27,000. Maturity about Jan. 1st, 1931.

Pre-Cooling and Packing Plant — La Verne Co-Operative Citrus Association, La Verne, Calif., awarded contract for a 2 story, 90 x 106 ft. pre-cooling and packing plant, to E. M. Mahl, La Verne. Estimated cost $75,000.

Packing Plant (Citrus)—Dousal Co., McAllen, Tex., awarded contract for the construction of a 1 and 2 story, 50 x 250 ft. plant for citrus fruits and vegetables to F. L. Moore, McAllen. Estimated cost $25,000.

Packing Plant (Citrus) — Glendora Lemon Growers Association, Glendora, Calif., awarded contract for a 2 story, 90 x 163 ft. packing plant to Mutter Bros., 742 East 61st St., Los Angeles. Estimated cost $45,000.

Packing Plant (Citrus) — R. Roots, San Perlita, Tex., plans the construction of a 1 story, 30 x 60 ft. citrus packing plant. Private plans.

Packing Plant (Citrus)—Texas Citrus Fruit Growers Exchange, c/o J. H. Shary, Mission, Tex., awarded contract for the construction of a 1 story, 58 x 75 ft. packing plant at Val Verde to J. E. Walsh, Mission. $20,000. Also plans a citrus packing plant at Mission. $22,000. Equipment for Mission plant will be required.

Packing Plant—Tom Huston Peanut Co., Orlando, Fla., awarded contract for the construction of a packing plant for frozen fruit to Gay Engineering Corp., 2650 Santa Fe St., Los Angeles, Calif.

Packing Plant—G. A. Carey, Inc., Plant City, Fla., awarded contract for a 150 x 150 ft. packing plant on East Reynolds St., to G. E. Wilson, Plant City.

Packing Plant—Co-Operative Packers of Ontario, Barrie, Ont., awarded contract for the construction of a 2 story packing plant including refrigeration unit, etc., on Main St. to Webb & Son, Mississage St., Orillia. Estimated cost $100,000. Private plans. Complete equipment will be required.

Packing Plant—Elkhart Packing Co., Elkhart, Ind., will soon award contract for the construction of a packing plant, south of Elkhart. Estimated cost $41,000. H. Miller, Elkhart, is architect.

Packing Plant—Wilmington Packing Co., Inc., E. T. Murphy, Gen. Mgr., Wilmington, Mass., is having sketches made for rebuilding packing plant on Eames St. destroyed by fire. Estimated cost to exceed $40,000. Private plans.